FIELD SURVEY REPORT
ON THE PLAN FOR IMPROVING
THE METEOROLOGICAL TELECOMMUNICATION SYSTEM
IN THE REPUBLIC OF THE PHILIPPINES

December 1981

JAPAN INTERNATIONAL COOPERATION AGENCY

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PREFACE

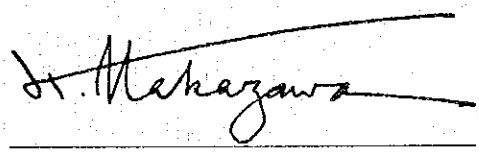
In response to a request of the Government of the Republic of the Philippines and as a follow-up of the basic survey conducted from October 20 to November 19, 1980, the Government of Japan decided to conduct a field survey for the improvement of the meteorological telecommunication system in the Philippines. The Japan International Cooperation Agency (JICA) was entrusted by the Government with the survey and dispatched four meteorological telecommunication experts of the Japan Meteorological Agency (JMA), i.e. Messrs. Tetsuro FUKUI, Motohiro FUJII, Mitsuo IGARASHI, and Norinao SUZUKI, to the Philippines from October 20 to December 19, 1981.

The experts conducted a survey and had discussions with their counterparts of the Philippine Atmospheric Geophysical and Astronomical Services Administration (PAGASA) of the Government of the Philippines. Based on the findings of the survey and further studies subsequently made in Japan, they have compiled this report.

I hope this report will contribute to the improvement of meteorological data collection and warning dissemination in the Philippines, thus dedicating to the promotion of friendly relations between our two countries.

I wish to express my deep appreciation to the officials concerned in the Philippines for their close cooperation extended to the experts.

December 1981



Kazuto NAKAZAWA
Executive Director
Japan International Cooperation Agency

CONTENTS

1. INTRODUCTION

1-1 The Technical Cooperation proposed for improving the Meteorological Telecommunication Systems

The Philippines are situated near the eastern edge of the Eurasian Continent between the latitudes of 5°N and 21°N, and are directly affected by typhoons and monsoons which cause serious disasters every year.

It is one of the important policies of the government to prevent or mitigate disasters in order to improve public security, public welfare, land conservation and the development of the country.

In order to prevent meteorological disasters, it is important that the weather forecasts and/or warnings are communicated appropriately and timely. The PAGASA's (Philippine Atmospheric, Geophysical and Astronomical Services Administration) telecommunication systems, however, have some problems which disturb even internal communication within PAGASA.

It was mutually agreed by the meteorological representative of Japan and the Philippines at the 11th conference of the ESCAP/WMO Typhoon Committee held in Bangkok that Japan would dispatch meteorological telecommunication experts and assist in improving the PAGASA's telecommunication systems.

Based on this agreement, the Government of the Philippines requested the Government of Japan to dispatch the meteorological telecommunication experts and conduct the survey work. In response to this request, through the Japan International Cooperation Agency (J. I. C. A.), the Government of Japan sent the first survey team to the Philippines from 20 Oct. to 19 Nov. 1980. This team completed its preliminary survey on the meteorological telecommunication systems.

According to the findings and recommendations of the first survey team, the second survey team was also dispatched by the Japanese Government from 20 Oct. to 19 December 1981.

The results and recommendations are described in this report.

During the survey work, the team experienced two typhoons which showed the importance of preparing the meteorological telecommunication networks.

Figure 1-1 shows the course of the two typhoons. In the case of "Yeyeng", it was announced that 4 persons died and 6 persons were injured. Also "Typhoon Anding" caused the death of 261 and injured 95.

In these cases, we were deeply aware that the present meteorological telecommunication systems and the observational instruments were not sufficient to provide adequate meteorological information. When the telecommunication systems is improved, PAGASA may receive more sufficient meteorological information to improve typhoon forecasts and warnings and it may also help the public to take a growing interest in meteorological work. These are very important and effective in preventing disasters.

The meteorological data, which are concentrated in Manila via the domestic telecommunication systems, are also disseminated to other countries via the Global Telecommunication System (G. T. S.) and are expected to contribute to weather analysis of other Aisan countries.

Considering that meteorological work takes place all over the world, this technical Cooperation between Japan and the Philippines is expected to contribute to other countries.

The Japan Meteorological Agency will continue this technical cooperation to improve the meteorological telecommunication systems.

1-2 Members of the survey team

Expert in Meteorological telecommunication	Tetsuro Fukui Assistant to Chief Facility Management Section, Meteorological Satellite Center, JMA
- ditto -	Motohiro Fujii Engineer Radio Communication Division Forecast Department, JMA
- ditto -	Mitsuo Igarashi Engineer Radio Communication Division Forecast Department, JMA
- ditto -	Norinao Suzuki Engineer Meteorological Instruments Plant, JMA

1-3 Scope of Work of the second survey team

Based on the report of the first survey team, the second survey team carried out two types of work:

A. To make a plan for introducing the VHF link in Luzon Island, the survey team conducted the propagation tests. To complete the tests, preparations were carried out to select the weather stations to draw the profiles and to estimate the link budgets. All the weather stations, where the propagation tests were carried out, are shown in Figure 1-2. During these tests, 1 Hi-Ace, 2 Jeeps and 1 truck were used. Table 1-1 shows all the distance covered during the propagation tests.

   The survey team gave a lecture to the PAGASA's Engineers and technicians about the basic principle of radio wave propagation which was necessary to carry out the propagation tests effectively.

   The text, which was used for this lecture, is attached to Appendix V.

B. The survey team also precisely investigated the various conditions at Cebu, Davao and Zamboanga weather stations. These are important when installing the new telecommunication facilities.

   The day's schedule of the sruvey work is recorded in Appendix-I.

Based on the findings of the survey, the discussions with PAGASA and further studies subsequently made in Japan, this report was completed by the survey team.

1-4 Acknowledgements

The team is pleased to acknowledge the considerable assistance of Dr. R. L. Kintanar, Director-General, Philippine Atmospheric, Geophysical and Astronomical Services Administration (P. A. G. A. S. A.) and his staff members for their active and enthusiastic cooperation. The team also would like to express their appreciation to the staff members of the Typhoon Committee Secretariate (TCS) for their helpful advice.

2. SUMMARY OF SURVEY WORK

2-1 VHF propagation test

2-1-1 Objective of the propagation test

When we design the VHF links, the following procedure is used:

A. Select the appropriate weather stations

B. Draw up a topographical profile using topographical maps drawn on a scale of 1/50,000.

C. Estimate the link budget to briefly evaluate the link.

D. Carry out the propagation test to investigate the effects of the rise and fall of the topography, trees, buildings, external noise, etc. The procedure of the tests are shown in Appendix II.

E. Based on the results of the tests, transmitting power, frequency, the type and height of an antenna are decided.

This procedure will be helpful in recognizing the importance of the propagation tests.

2-1-2 Results of the propagation tests

We executed the propagation tests of the following sections, based on the procedures mentioned in 2-1-1. The precise results are shown in Appendix III.

TUGUEGARAO – (GATTARAN) – APARRI

NAGA – LEGASPI

NAGA – DAET

TANAY – TAYABAS

CARMEN, ROSALES – IBA

The measurement values of the signal to noise ratio (S/N) are shown in the following table.

Section	Measured S/N (db)	Estimated S/N (db)	Date
Tuguegarao – Aparri	48	49.2	Oct. 31
Legaspi – Naga	38	38	Nov. 17
Naga – Daet	54	51.4	Nov. 20
Tayabas – Tanay	59	57.8	Nov. 22
Iba – Carmen	43	45.1	Nov. 27

List of the main equipment and implements used

A. Field Strength Meter
   ANRITSU, Model ML-518A — 2 sets

B. FM Transceiver
   JRC, Model JHV-225 — 2 pcs

C. Portalbe Antenna
   MASSPRO, 144WH8 — 2 pcs

D. CM-type Wattmeter
   FUJISOKU, TLP-52W — 2 pcs

E. Pole (15m) MSA-15 — 2 sets

F. Level Meter
   001, LM-2 — 1 pc

G. Coaxial Feeder
   8D-2V, 25m, 5D-2V, 1m

Member of the Survey Groups

Group–A

Mr. T. Fukui (JMA)
Mr. M. Igarashi (JMA)
Mr. S. F. Fontano – Chief, Meteorological Communication Div.
Mr. M. N. Maraña – Electrical Engineer
Mr. E. M. Morales – Supervising Radio Technician
Mr. C. E. Santos – Teletype Technician

Group–B

Mr. M. Fujii (JMA)
Mr. N. Suzuki (JMA)
Mr. R. B. Bito-On – Senior Electrical Engineer
Mr. E. H. Garcia – Electronic Engineer
Mr. F. Datoc – Seismologist
Mr. G. Q. Prenda – Radio Technician
Mr. R. Cruz – Radio Technician

2-2 Results of the site survey

During the survey all over the Philippines, the team investigated the situations of the weather stations. The results are shown in Appendix IV.

2-3 Findings about the observation systems

The observation systems are also an important factor in meteorology, but the survey team recognized several problems during the sruvey work: Trouble with instruments, insufficient maintenance and inadequate calibration. Even if the telecommunication systems were improved, the PAGASA's meteorological data would still contain large errors without the improvment of these problems.

2-3-1 The Measurement instruments

A. The team experienced trouble with the following instruments:

Wind vane and anemometer.	Tuguegarao, Aparri, Dagupan
Radar	Daet, Cebu

Rain gauge recorder	Tuguegarao, Dagupan
Thermograph	Daet
Shelter	Dagupan
Pyrheliometer	Science Garden
Actinometer	Zamboanga

B. Calibration of instruments

As an example of the calibration, we were told that each weather station's barometer is calibrated by a hand carried standard barometer every 6 months to 2 years. And this standard barometer is also calibrated by an Australian barometer every five years, but PAGASA has to arrange its own calibration systems.

2-3-2 Observation methods

A. One big problem is that the defective instruments are still in use. An appropriate maintenance and calibration system is needed.

B. It is desirable to improve radar observation as follows:

a. Radar observations should be more precisely conducted by using the overlay sketch sheets.

b. These data will be sent to Manila via the facsimile as mentioned later.

c. The observed data, such as sketch sheets and photographs, should be stored and then analysed to improve weather forecasting.

d. On the job traning, which is necessary to improve the observation technique, may be conducted not only in Japan but in the Philippines. It will be necessary to dispatch Japanese radar meteorological experts to the Philippines.

3. RECOMMENDATIONS

3-1 PAGASA's Telecommunication Systems

3-1-1 Basic principle of PAGASA's Telecommunication Systems (PTS) – Long term

The important roles of meteorological telecommunication are to collect the observed data and to disseminate such information as weather forecasts and warnings which are the results of weather analysis.

Especially when a typhoon is coming, it is possible to prevent meteorological disasters if the appropriate meteorological information is effectively communicated.

In addition, the meteorological telecommunication networks should be reliable.

From this viewpoint, it is desirable that PAGASA develops its own reliable meteorological telecommunication networks. Although external communication media are proposed (the army's microwave link and the teletype of the Universal Telecommunications service Inc.), it would be better to use these media as a temporary back-up system until the construction of PAGASA's own telecommunication system is achieved.

The second survey team submitted this recommendation, based on its field survey work.

It is considered that if necessary measures are taken, the situation would be improved.

3-1-2 Proposed PTS

A. Phase 1 (See Figure 3-1, 3-2)

a. In Luzon Island, the Synop data and the Radar Data will be collected as follows:

a-1 The VHF stations will be connected to the sub-centers (Tuguegarao, Carmen, Rosales, Naga) which are set by the Flood Forecasting and Warning Systems.

a-2 The channel assignment of the FFWS should be carefully considered when carrying out this plan.

a-3 The existing HF-SSB links may be used as back up facilities.

b. Various kinds of weather data will be disseminated from the Central Office via the above-mentioned VHF links.

c. A feasibility study of Over the Horizon multiplex links will be started. The objective of these OH links is to connect the Central Office with Cebu and Davao. At present, PAGASA plans to make the forecasting sub-centers in Cebu and Davao. Because the forecasting sub-centers will need plenty of information, it will be also necessary to make the telecommunication sub-centers at Cebu and Davao.

d. A simultaneous transmission network from PAGASA to the government organizations (if necessary, to the information media) will be installed.

B. Phase 2 (See Figure 3-1)

a. Meteorological telecommunication networks in Visayas and Mindanao may be established. Four kinds of HF frequencies will be used in each region.

b. The Synop Data and the Radar data will be collected via the HF and the UHF links. Various kinds of weather information is disseminated from the Central Office to each sub-center and synop stations via the same networks.

After completing the above-mentioned PTS, new plans and their execution, such as system automation (for example, an automatic data editing and switching system) and introduction of computer systems for weather analysis and forecasting will be considered.

3-1-3 Proposed VHF telecommunication link

In order to collect every kind of observational data from each station and to distribute the result as soon as these data are analyzed, the existing HF-SSB telecommunication link should be changed to the VHF telecommunication link which has excellent S/N quality and stability.

Every radio station that constitutes this VHF telecommunication link should also be equipped with the multiplex communication equipment that has synthetic functions needed for meteorological services.

Concerning this point, the survey team carried out VHF propagation tests at several synop and radar stations on Luzon Island and confirmed that those stations will be

able to connect with the FFS sub-center by VHF telecommunication circuits.

The survey team also found that the rest of the observatories can be connected to the FFS sub-center by the VHF telecommunication circuits, but it is necessary to carry out additional propagation tests by PAGASA to confirm this. According to the results of the propagation tests and the examinations mentioned above, the survey team will propose the new plan for the meteorological VHF telecommunication link and recommend its completion by PAGASA.

3-1-3-1 VHF telecommunication link and equipment

A. The VHF radio stations to be established in each observatory will be classified as VHF terminal stations and VHF relay stations which are based on their roles in the VHF telecommunication link.

The VHF terminal stations and VHF relay stations will adopt the 150 MHZ 3 CH multiplex telecommunication system, in which each channel is assigned to telephone, teletype and facsimile.

The system block diagrams of these stations are shown in Figure 3-3, 3-4 and 3-5.

B. The VHF-UHF relay stations will be established in each existing FFS, sub-center (TUGUEGARAO, CARMEN, ROSALES and NAGA) and TANAY relay station.

In these relay stations, 150 MHZ 3 CH multiplex telecommunication systems will be adopted, the same as for a VHF terminal station and VHF relay station.

The Meteorological data from the VHF terminal stations and VHF relay stations via 150 MHZ 3 CH multiplex circuits will be connected with the existing FFS circuits and transmitted to the PAGASA Central Office.

The PAGASA CENTRAL OFFICE will transmit the weather information to these stations, conversely, via the same circuits.

The system block diagram of the VHF - UHF relay stations are shown in Figure 3-6 and 3-7.

C. The 800 MHZ 24 CH multiplex telecommunication link will be adopted between the existing FFS station at SCIENCE GARDEN (N. F. F. C) and PAGASA CENTRAL OFFICE.

The system block diagram of the station at SCIENCE GARDEN (NFFC) is shown in Figure 3-8.

D. The 800 MHZ 24 CH multiplex telecommunication link will be also adopted between DILIMAN and PAGASA CENTRAL OFFICE.

The system block diagram is shown in Figure 3-9.

E. The Communication control center will be established at PAGASA CENTRAL OFFICE. The system block diagram is shown in Figure 3-10.

F. The uses for the 3 types of telecommunication links (telephone, teletype and facsimile) which will be adopted in each station are shown in Table 3-1.

G. The composition of the meteorological VHF telecommunication link is shown in Figure 3-2.

H. The classification of every station to be connected with the proposed meteorological VHF telecommunication link, is shown in Table 3-2 and 3-3.

3-1-3-2 Channel assignment

A. In every VHF terminal station, VHF Relay station and VHF - UHF Relay station to be installed with the 150 MHZ 3 CH multiplex system, one vacant channel of the 3 will be selected for each type of telecommunication (telephone, teletype and facsimile).

When only a telephone, teletype or facsimile will be used, the vacant channel will be automatically selected by the channel selector.

B. In the VHF - UHF Relay stations (in the Sub-Centers of FFS at TUGUEGARAO, CARMEN, ROSALES and NAGA), 2 channels will be assigned for meteorological telecommunication out of the exist-

ing FFS channels.

One vacant channel of these 2 will be also automatically selected for each type of telecommunication in the 150 MHZ 3 CH multiplex system.

C. In the VHF - UHF Relay Station at TANAY, 3 channels will be also assigned for meteorological telecommunication, out of the existing FFS channels.

One of the vacant channels of these 3 will be also selected the same as above.

3-1-3-3 Interface with the FFS

In the VHF - UHF Relay Stations (at TUGUEGARAO, CARMEN, ROSALES, NAGA and TANAY) and VHF - UHF Relay Station at NFFC SCIENCE GARDEN, it will be necessary to design the optimum interface between the existing FFS and the new 150 MHZ 3 CH or 800 MHZ 24 CH multiplex telecommunication system.

3-1-3-4 Proposed propagation tests

The survey team carried out the VHF propagation tests in cooperation with PAGASA's staff to confirm the possibility of the various observatories being connected with the proposed VHF meteorological telecommunication link.

The survey team proposes that the additional propagation tests be carried out by PAGASA's staff to confirm the possibility of establishing the VHF link.

The propagation tests are shown below.

a. VIGAN – LAOAG
b. LAOAG – APARRI
c. MUÑOZ – BALER
d. BALER – a Relay Point will be needed between BALER and CASIGURAN
e. CASIGURAN – the Relay Point

f. TANAY – INFANTA
g. TANAY – ALABAT
h. TANAY – AMBULONG
i. TANAY – CALAPAN (Mindoro Is.)
j. LEGASPI – MASBATE (MASBATE Is.)

When the propagation test plans are arranged, we hope that the PAGASA's staff will consult with JMA and telecommunication experts.

3-2 Operation and Maintenance

3-2-1 Arrangement of technical supervisors

In order to properly operate the telecommunication systems, several technical supervisors are to be assigned at each sub-center and at the Central Office.

3-2-2 Training of Engineers and Technicians

In order to maintain the proposed VHF telecommunication link in the best condition, it is very important to train PAGASA's Engineers and Technicians who operate and maintain the VHF telecommunication link.

This training will be carried out continuously in Japan and the Philippines until effective operation of the VHF link is established for the meteorological services.

3-3 Future Plan – Short Term

JICA and JMA conducted the survey work for the improvement of PAGASA's telecommunication system by dispatching meteorological telecommunication experts in 1980 and 1981. The necessity of improving telecommunication systems has been confirmed by the second survey team as described above.

To carry out the improvement plan, which is described in this report, it is necessary to dispatch Japanese telecommunication experts and to make a precise plan.

The scope of work of the next survey team may be as follows:

A. To draw up the specifications necessary for preparing the proposed VHF link
B. To estimate the total cost
C. To prepare the annual plan for improving the telecommunication network

D. To train the engineers and technicians

E. To conduct the field survey work – site survey, propagation test

These recommendations will be executed in cooperation with PAGASA, JICA and JMA. In this respect, it is desirable that the Philippine Government requests "the Development Survey Program" from the Japanese Government.

3-3-1 Installation of VHF telecommunication link

When the VHF radio equipment is installed in the observatories, which have been confirmed for connection to the proposed VHF telecommunication link, these observatories should take priority over other observatories.

The other observatories to be confirmed for connection to the VHF telecommunication link by additional propagation tests should be installed one after another.

On the other hand, the existing SSB link should be kept in its present state, until effective operation of the VHF telecommunication link is established.

3-3-2 Training

It is desirable to train two of the staff from PAGASA for five or six months in Japan every year before executing the proposed telecommunication systems.

It is also necessary to train as many of the PAGASA staff as possible. This is on-the-job training of the operation and maintenance in the Philippines using the installed equipment of the VHF telecommunication link and its system.

To carry out this training, the training procedure of FFWS may be referred.

The survey team proposes that this training be carried out continuously throughout the term up to the time when effective operation of the VHF link is established instead of the existing SSB link.

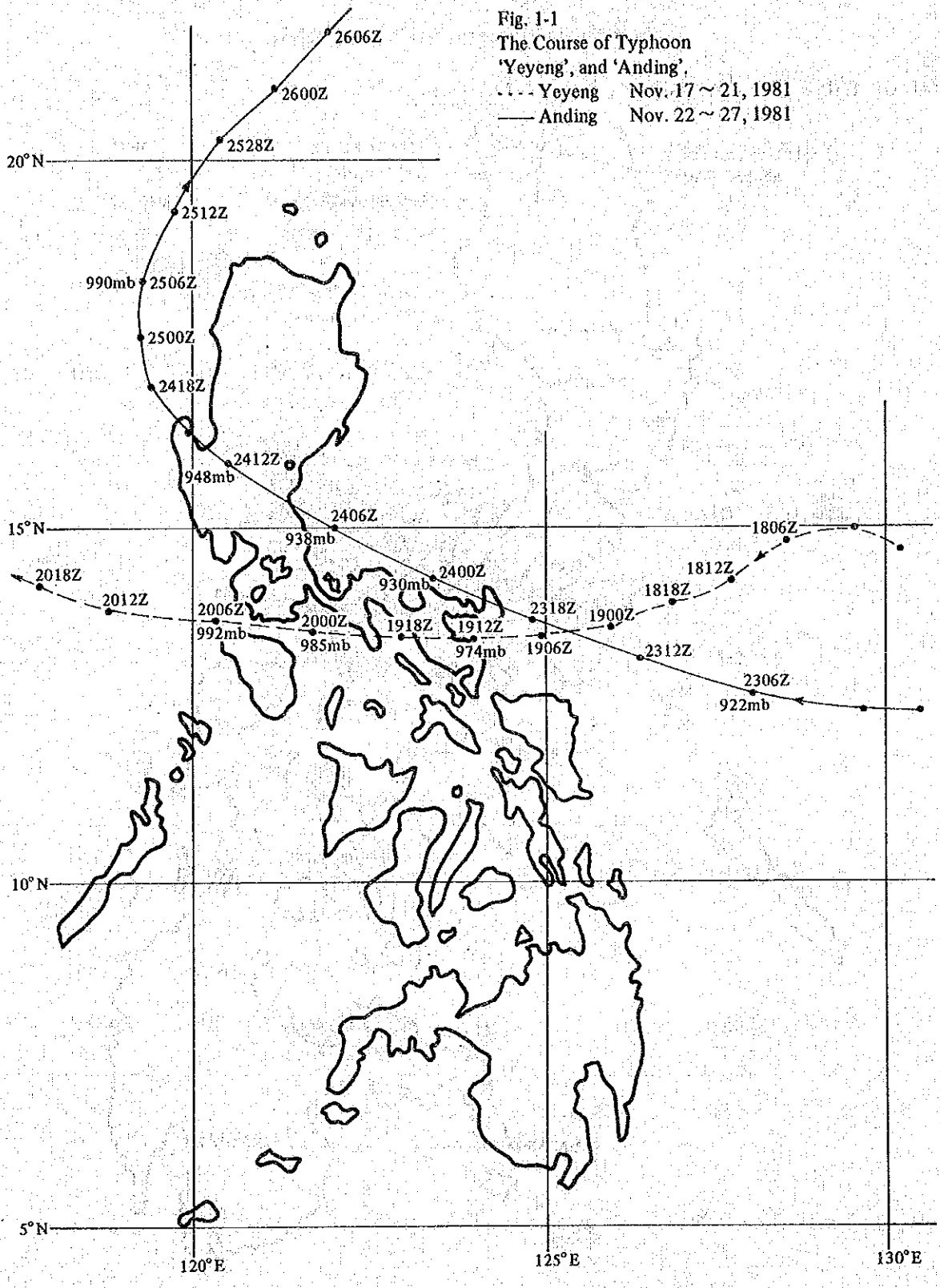


Fig. 1-1
The Course of Typhoon
'Yeyeng', and 'Anding',
- - - - Yeyeng Nov. 17 ~ 21, 1981
—— Anding Nov. 22 ~ 27, 1981

Fig. 1-2
MAP OF THE SURVEY WORK

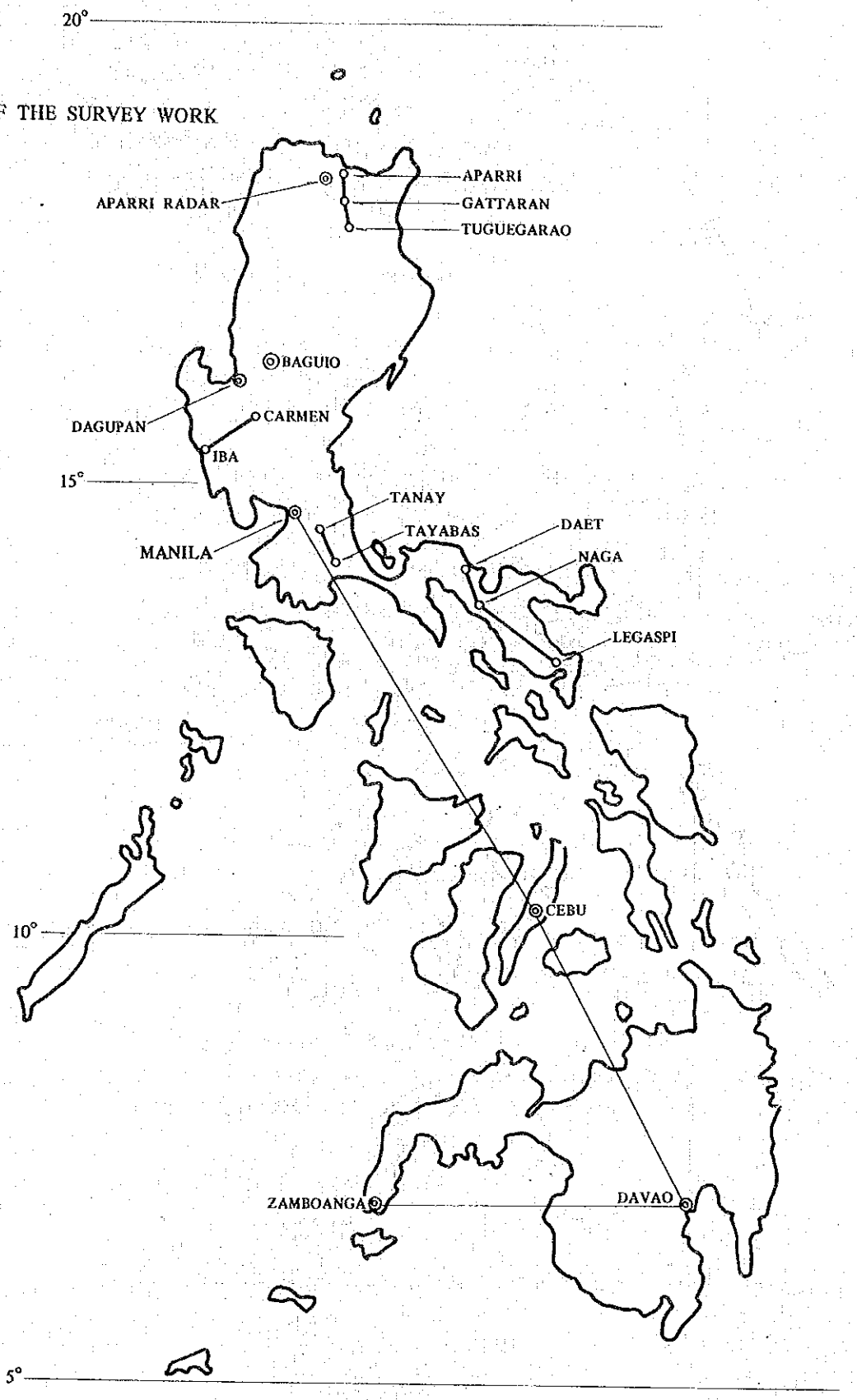


Table 1 - 1 The Distance of Survey Works

Group - A

Date	Places Visited	Distance Travelled (Km)
Oct. 28, 1981	Manila-Carmen Sub-center	180
	Carmen - Tuguegarao	312
Oct. 29	Tuguegarao - Gattaran	75
	Gattaran - Tuguegarao	75
Oct. 30	Tuguegarao - Gattaran	75
	Gattaran - Aparri	45
Nov. 1	Aparri Synop - Aparri Radar	50
	Aparri Radar - Aparri Synop	50
Nov. 2	Aparri Synop - Tuguegarao	120
Nov. 3	Tuguegarao - Manila	485
Nov. 16	Manila - Legaspi	553
Nov. 18	Legaspi - Naga	107
Nov. 21	Naga - Daet	102
	Daet - Tayabas	215
Nov. 22	Tayabas - Manila	145
Nov. 26	Manila - Iba	210
Nov. 27	Iba - Dagupan	270
Nov. 28	Dagupan - Carmen	45
	Carmen - Manila	180
	Total	3,294

Group - B

Date	Places Visited	Distance Travelled (Km)
Oct. 26, 1981	Manila - San Fernando	300
Oct. 27	San Fernando - San Fernando (by ship)	440
Oct. 28	San Fernando - Carmen	120
	Carmen - Tuguegarao	312
Nov. 1	Tuguegarao - Aparri Synop	120
	Aparri Synop - Aparri Radar	50
	Aparri Radar - Aparri Synop	50
Nov. 2	Aparri Synop - Tuguegarao	120
Nov. 3	Tuguegarao - Manila	485
Nov. 16	Manila - Naga	446
Nov. 19	Naga - Daet	102
Nov. 21	Daet - Tanay	400
Nov. 22	Tanay - Manila	60
Nov. 26	Manila - Carmen	180
Nov. 27	Carmen - Dagupan	45
Nov. 28	Dagupan - Carmen	45
	Carmen - Manila	180
	Total	3,455
Nov. 28	Carmen - Baguio	70
Nov. 29	Baguio - San Fernando	50
	San Fernando - Manila	300
Dec. 2	Manila - Cebu	584
Dec. 4	Cebu - Davao	406
Dec. 5	Davao - Zamboanga	390
Dec. 7	Zamboanga - Manila	870
	Total	2,670

Fig. 3-1 PROPOSED PTS

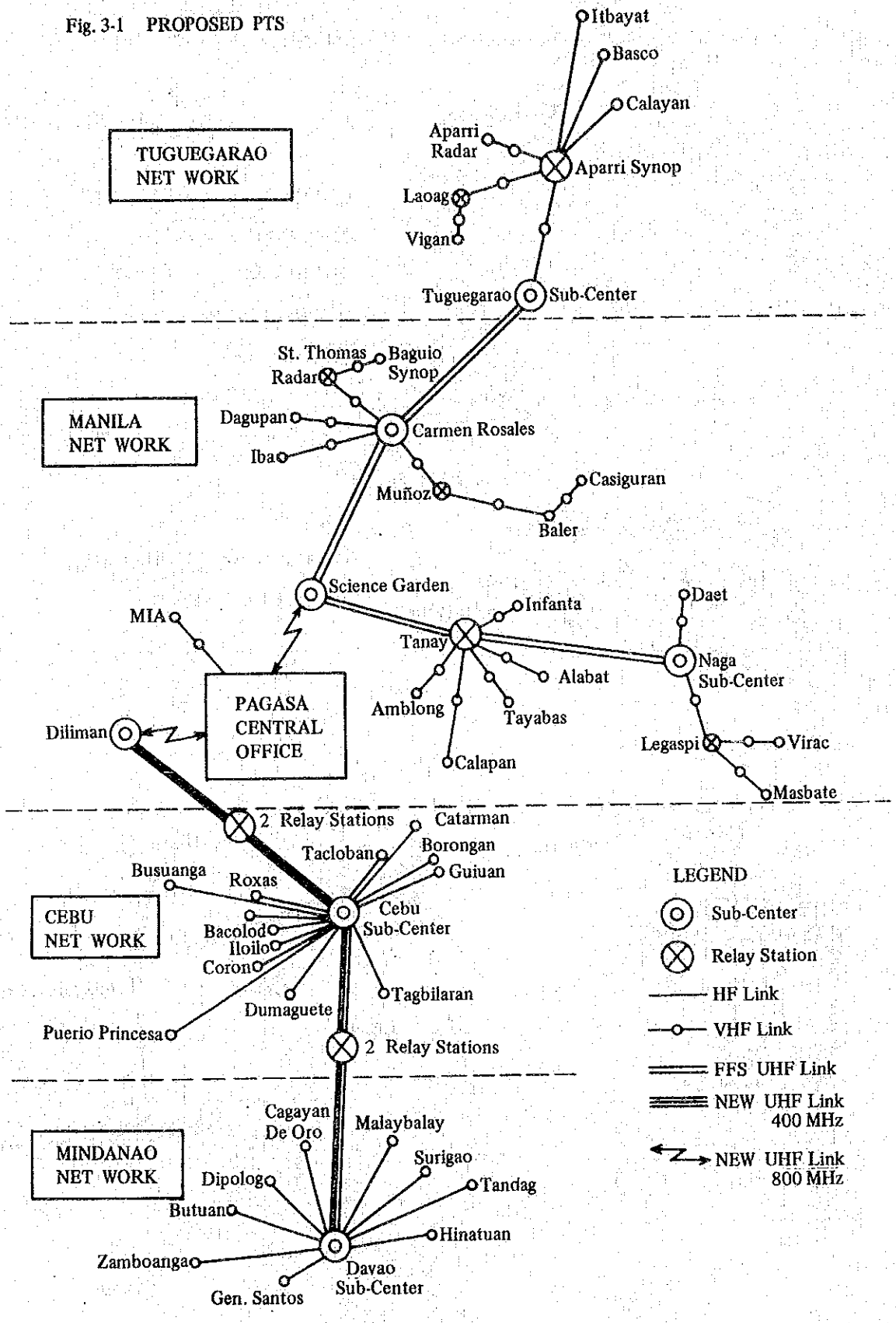


Fig. 3-2 PROPOSED METEOROLOGICAL VHF TELECOMMUNICATION LINK

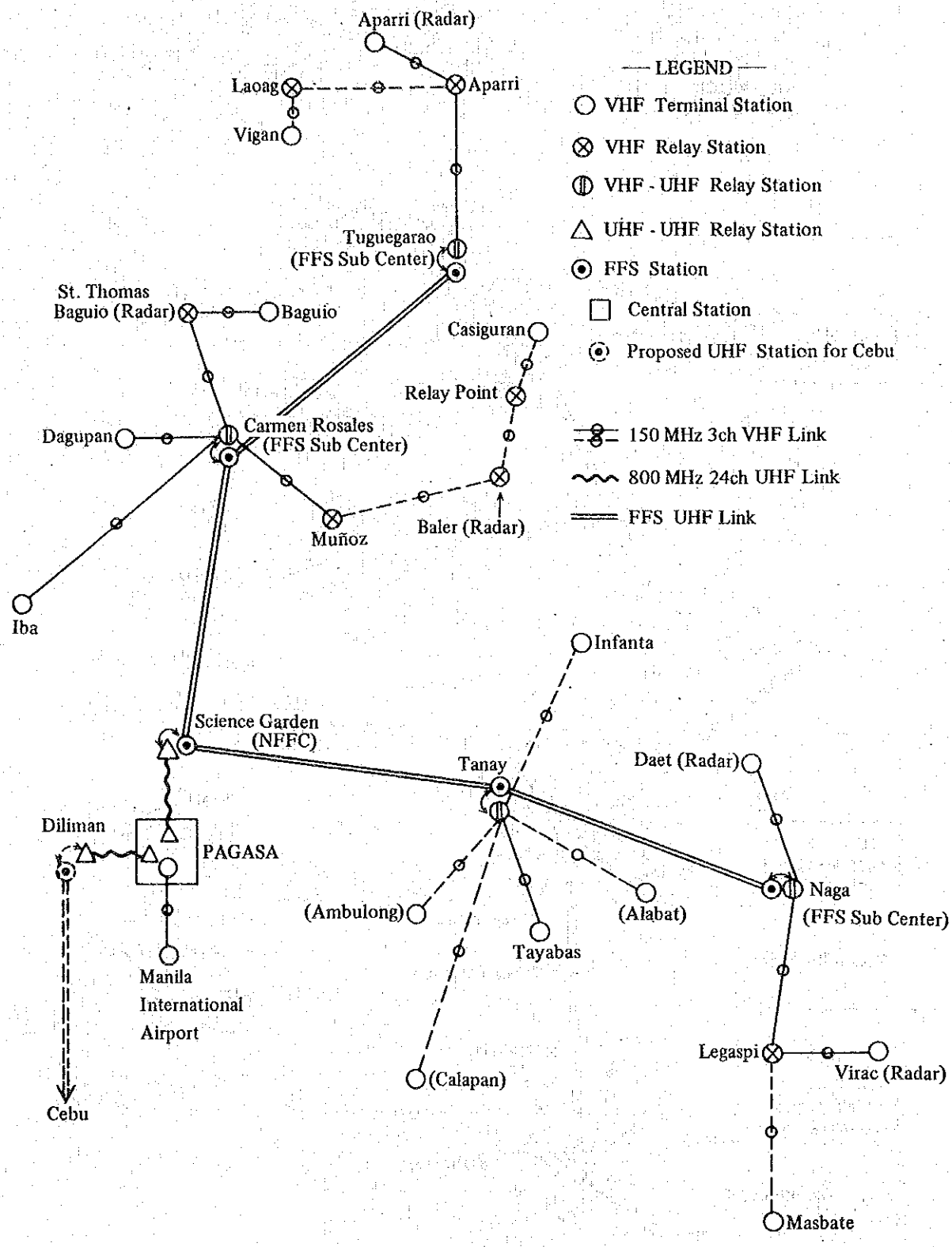


Fig. 3.3. System Block Diagram of the VHF Terminal Station
(Redundant System)

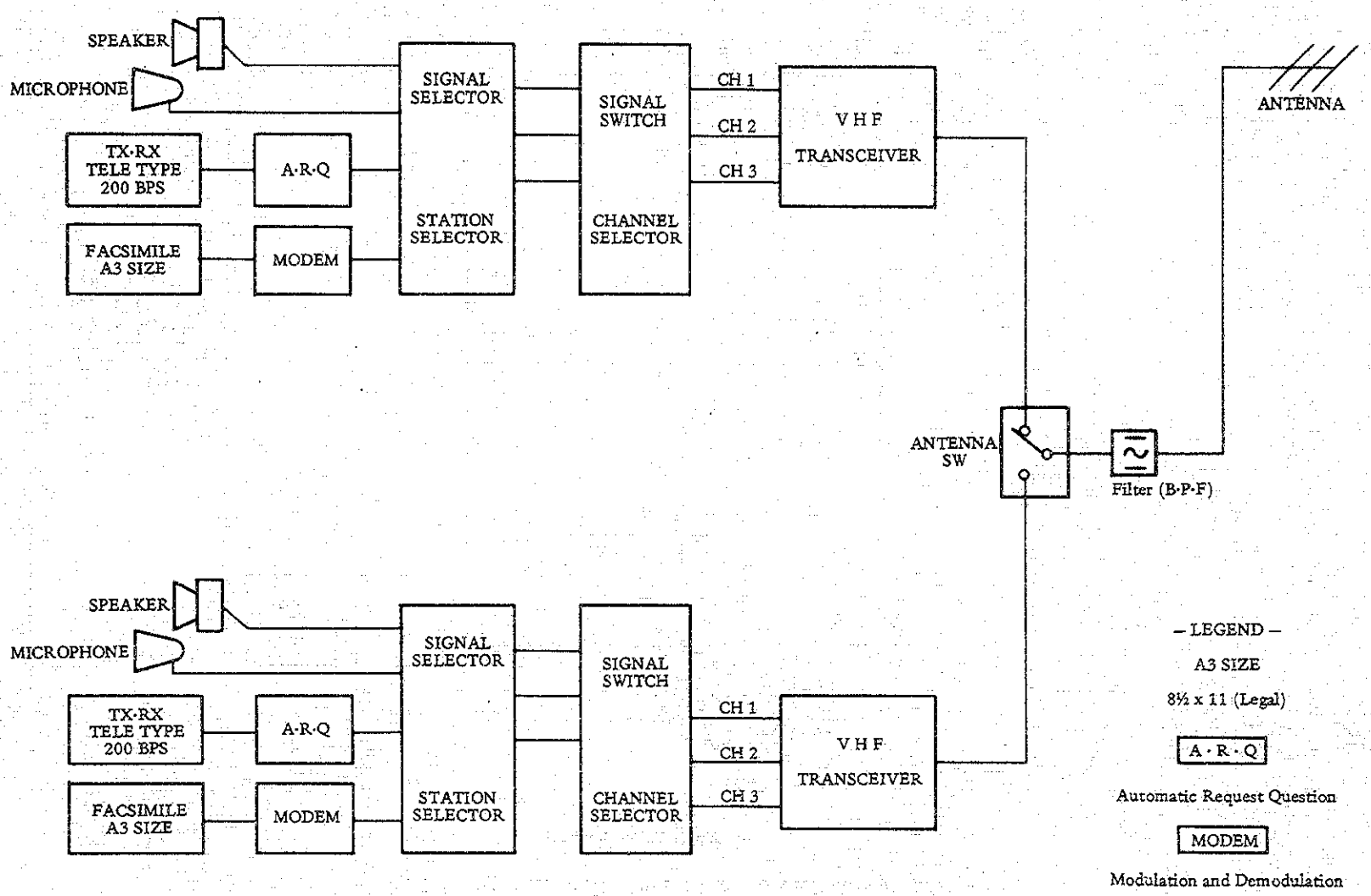


Fig. 3.4. System Block Diagram of the VHF Relay Station

(Redundant System)

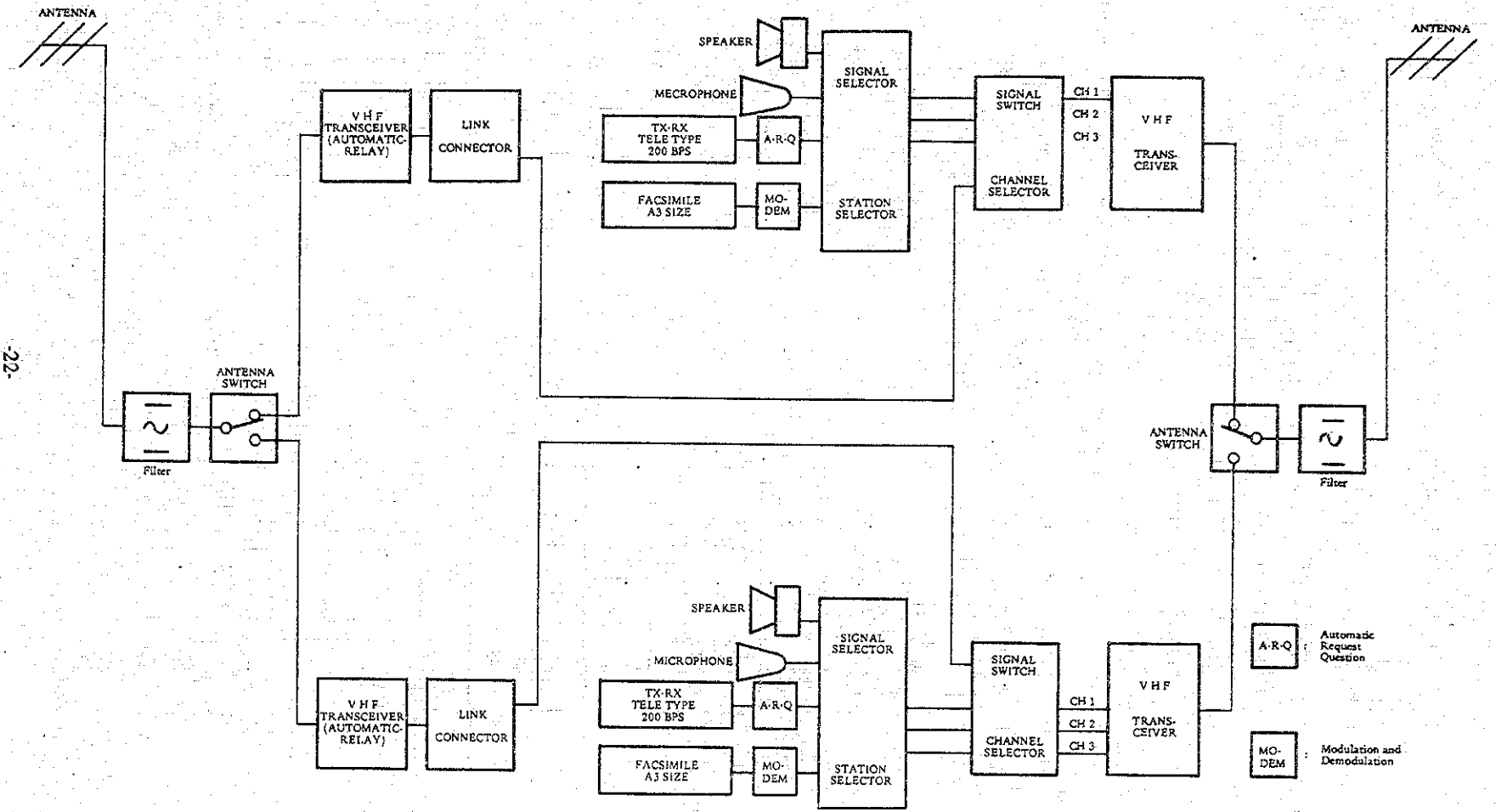


Fig. 3-5 SYSTEM BLOCK DIAGRAM OF THE VHF RELAY STATION (UNMANED)

(SOLAR BATTERY POWER SUPPLY SYSTEM IS PROPOSED)
(REDUNDANT SYSTEM)

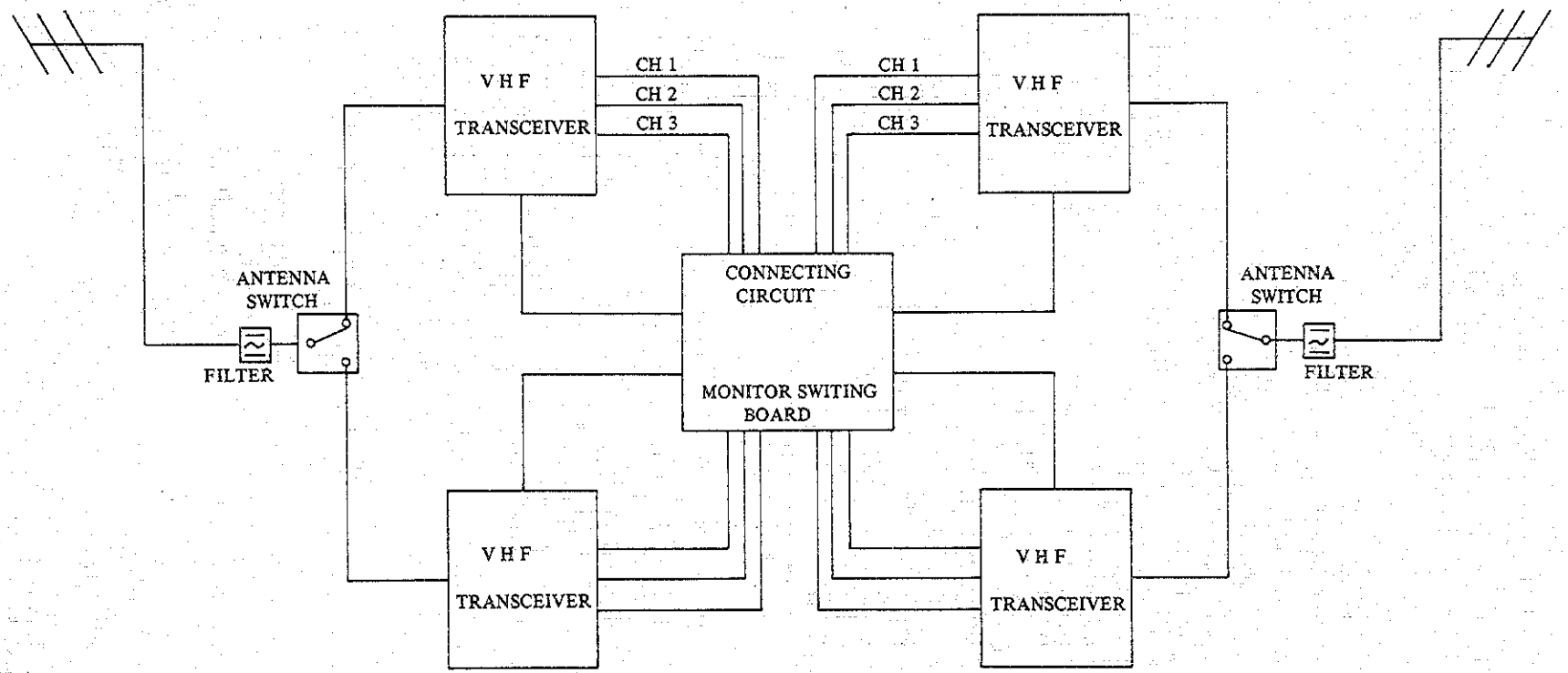


Fig. 3.6. System Block Diagram of the VHF – UHF Relay Station

(Redundant System)

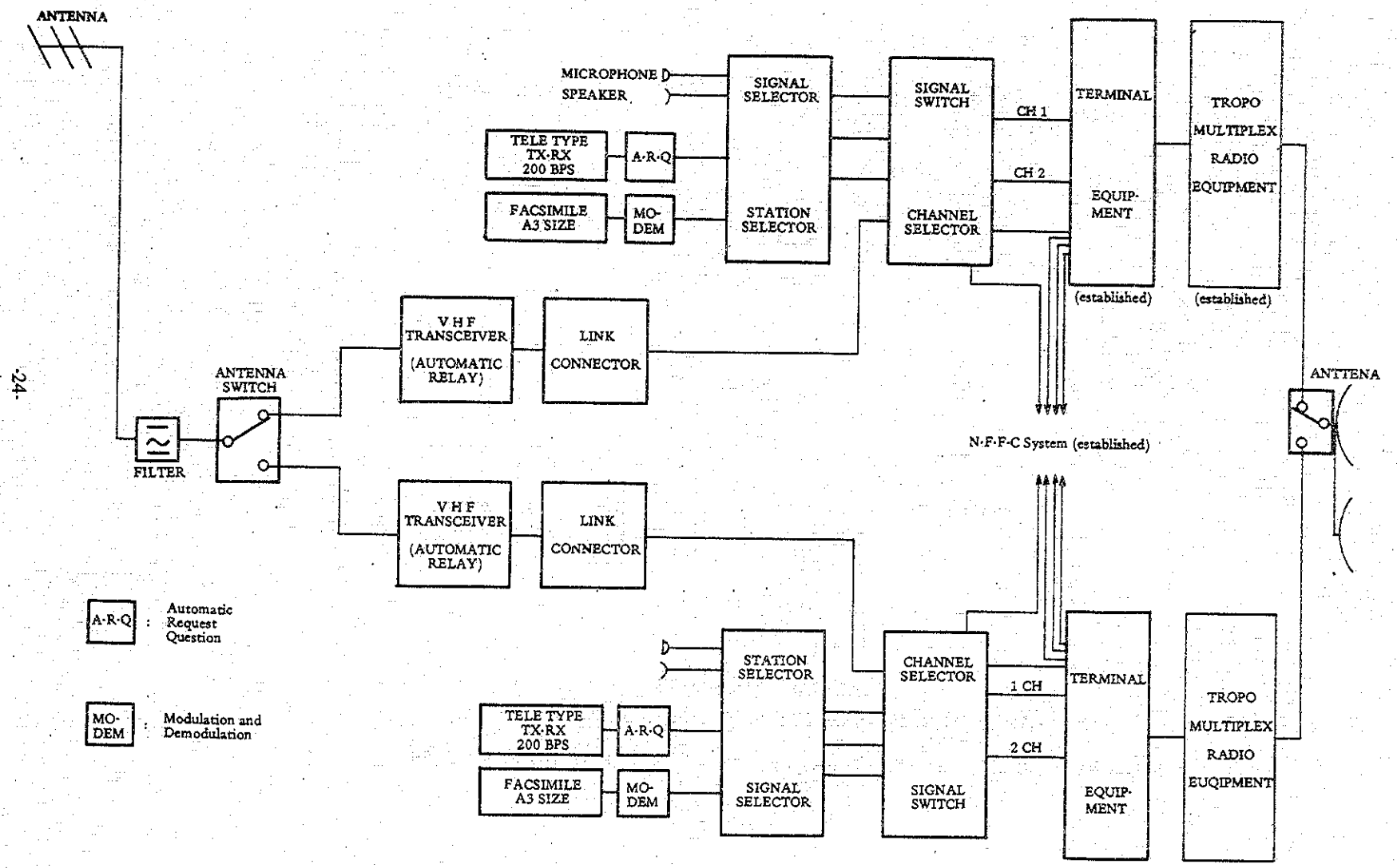


Fig. 3.7. System Block Diagram of the VHF – UHF Relay Station (TANAY)
(Redundant System)

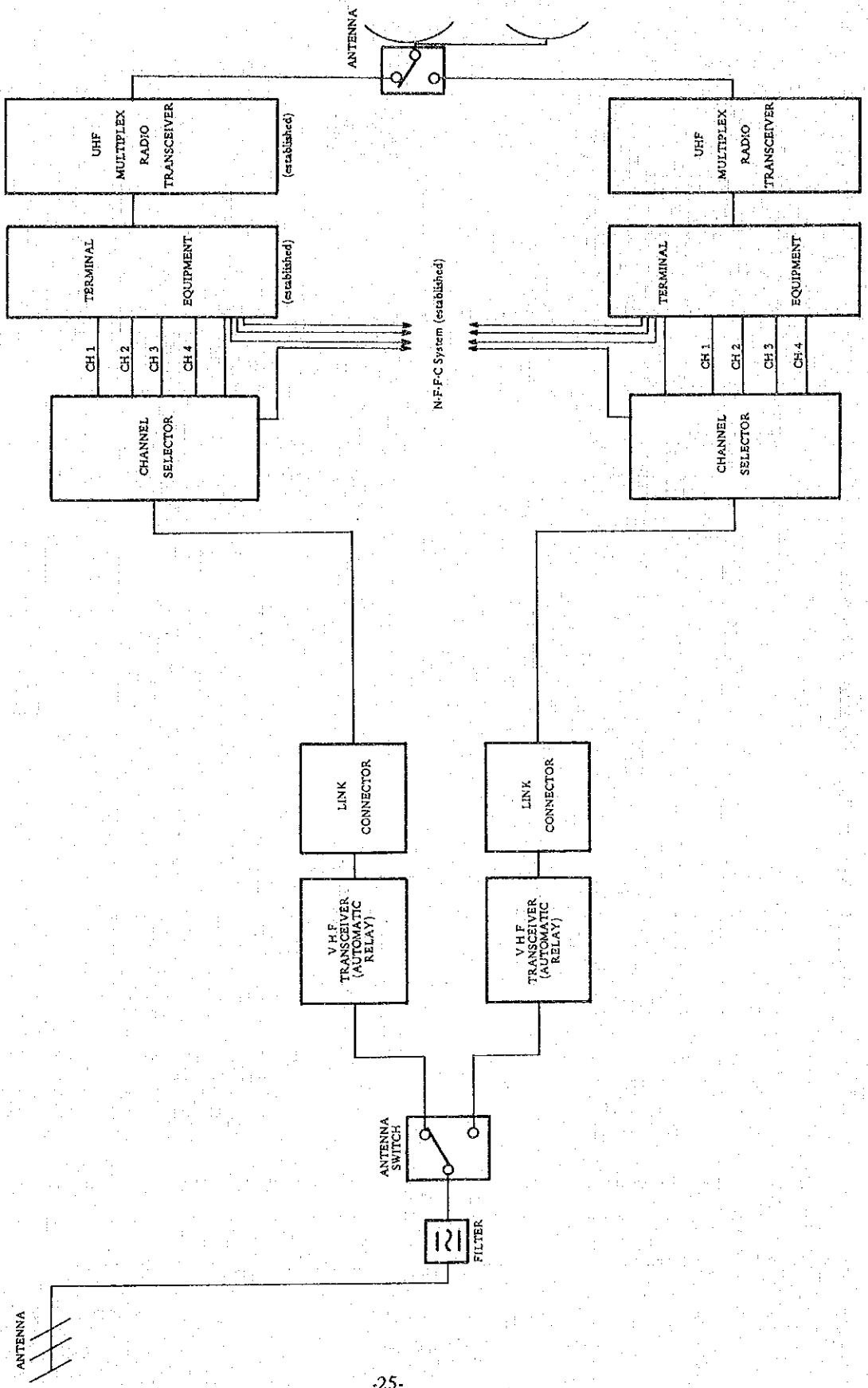
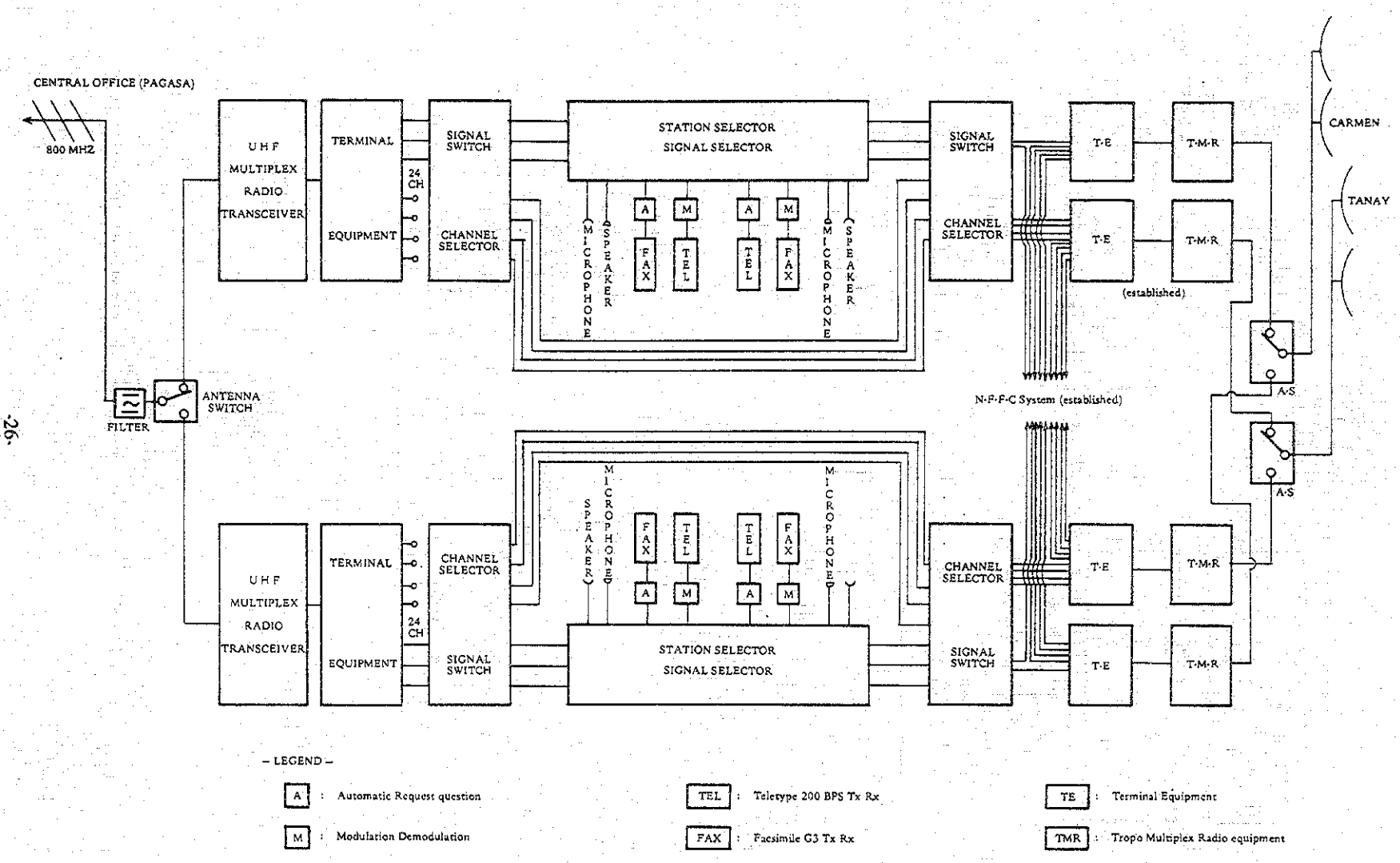


Fig. 3.8. System Block Diagram of the Science Garden



– LEGEND –

A	: Automatic Request question	TEL	: Teletype 200 BPS Tx Rx	TE	: Terminal Equipment
M	: Modulation Demodulation	FAX	: Facsimile G3 Tx Rx	TMR	: Tropo Multiplex Radio equipment

Fig. 3.9. System Block Diagram of the Diliman

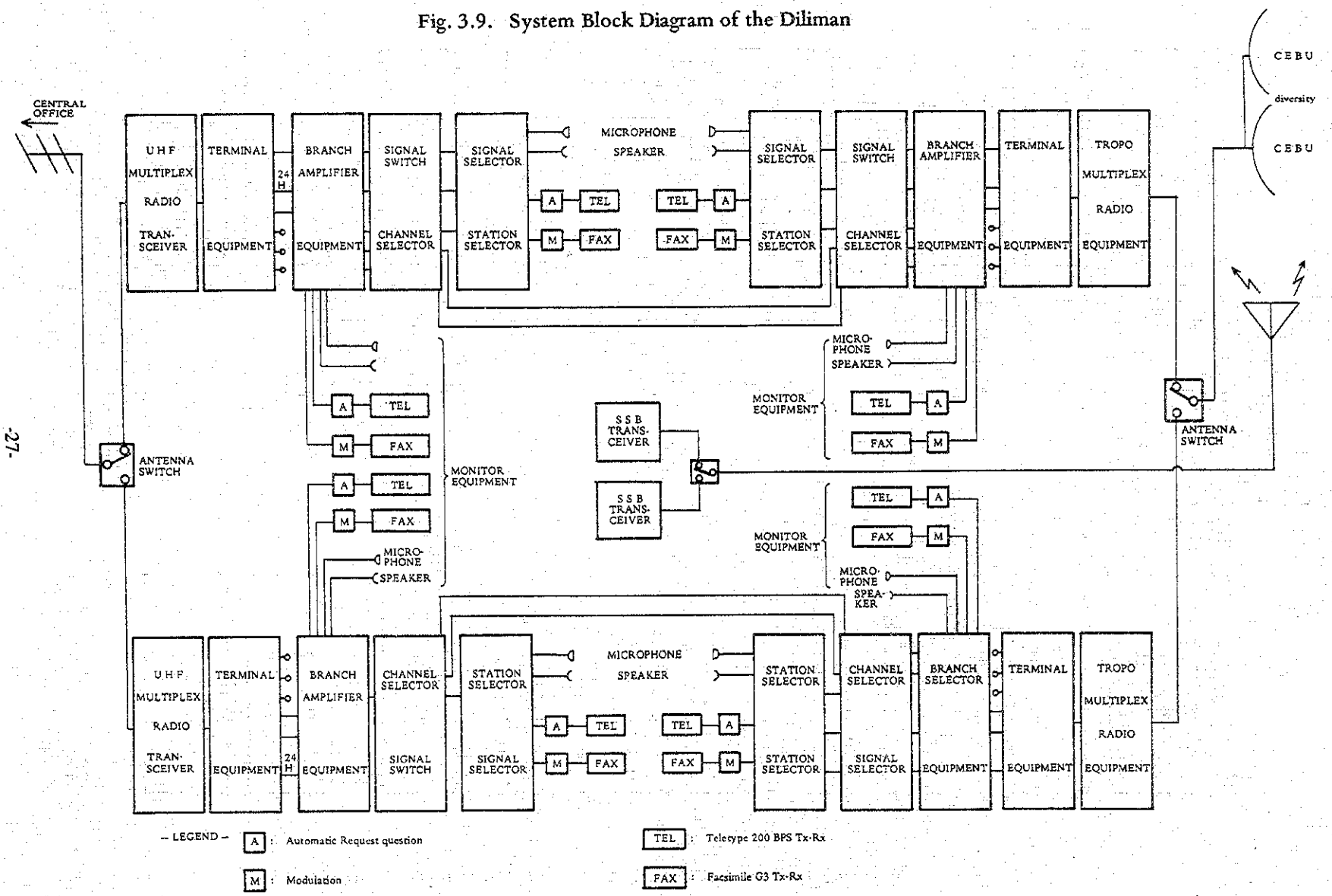


Fig. 3.10. System Block Diagram of the Communication Control Center (PAGASA)

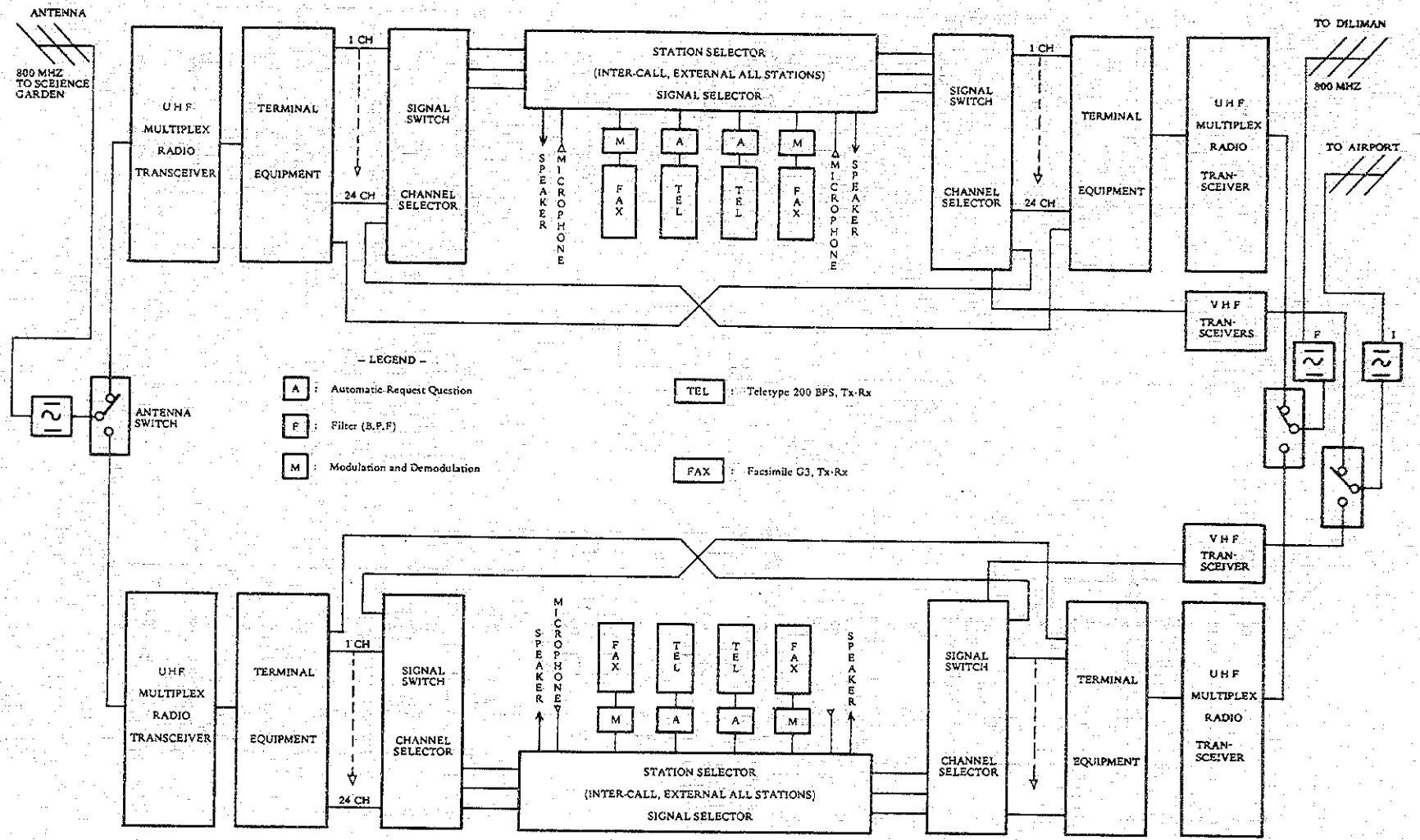


Table 3.1 TYPES OF TELECOMMUNICATION LINKS

Direction of Data Flow	Type of the Link	Remarks
From Terminal Station / Relay Station To PAGASA-C.O.	Telephone	Official Communications
	Teletype	Transmission of radar information, Synop data and upper air data
	Facsimile	Transmission of radar sketch* and official documents
From PAGASA-C.O. To Terminal Station / Relay Station	Telephone	Official Communications
	Teletype	Dissemination of the weather forecast, warning, analysis, radar information and edited data of Synop and upper air data
	Facsimile	Dissemination of every kinds of weather map, radar sketch and official documents

* Each radar site is needed to draw a sketch for each observation.

Table 3.2 CLASSIFICATION OF STATIONS* OF THE METEOROLOGICAL VHF TELECOMMUNICATION LINK

* The possibility of the VHF. T.L. has been examined by the survey team

Station	Classification	Remarks
Ducan (Aparri Radar)	150 MHZ 3CH VHF Terminal Station	For Aparri
Aparri	150 MHZ 3CH VHF Relay Station	For Tuguegarao, Ducan & Laoag
St. Thomas (Baguio Radar)	" " "	For Baguio & Carmen Rosales
Baguio	150 MHZ 3CH VHF Terminal Station	For St. Thomas (Baguio Radar)
Dagupan	" " "	For Carmen Rosales
Iba	" " "	" "
Muñoz	150 MHZ 3CH VHF Relay Station	For Carmen Rosales (& Baler)
Tuguegarao (FFS Sub Center)	150 MHZ 3CH VHF–UHF Relay Station	For Aparri
Carmen Rosales (FFS Sub Center)	" " "	For Baguio, Dagupan, Iba Muñoz
Tanay	" " "	For Tayabas (& other stations)
Tayabas	150 MHZ 3CH VHF Terminal Station	For Tanay
Daet (Radar)	" " "	For Naga
Naga (FFS Sub Center)	150 MHZ 3CH VHF--UHF Relay Station	For Daet (Radar) & Legaspi
Legaspi	150 MHZ 3CH VHF Relay Station	For Naga & Virac (Radar)
Virac	150 MHZ 3CH VHF Terminal Station	For Legaspi
M. I. A.	150 MHZ 3CH VHF Terminal Station	For PAGASA C. O.
Diliman	800 MHZ 24CH UHF–UHF Relay Station	" "
Science Garden	" " "	" "
PAGASA C. O. (Communication Control Center)	150 MHZ 3CH VHF 800 MHZ 24CH UHF 800 MHZ 24CH UHF } Central Station	For MIA For Diliman For Science Garden

Table 3.3 CLASSIFICATION OF OTHER STATIONS* OF THE METEOROLOGICAL VHF TELECOMMUNICATION LINK

Station	Classification	Remarks
Baler (Radar)	150 MHZ 3CH VHF Relay Station	For Muñoz & Relay Point for Casiguran
Relay Point for Casiguran	150 MHZ 3CH VHF Relay Station	For Casiguran/Baler
Casiguran	150 MHZ 3CH VHF Terminal Station	For Relay point for Baler
Vigan	" " "	For Laoag
Laoag	150 MHZ 3CH VHF Relay Station	For Vigan & Aparri
Infanta	150 MHZ 3CH VHF Terminal Station	For Tanay
Alabat	" " "	For Tanay
Calapan	" " "	" "
Ambulong	" " "	" "
Masbate	" " "	For Legaspi

* The possibility of the VHF. T.L. is to be examined by conducting the additional propagation tests.

APPENDIX I

THE DAY'S SCHEDULE OF SURVEY WORK

The day's schedule of survey work

1981

Oct.	20 (Tue)	Arrival at Manila
	21 (Wed)	Visit and meeting to JICA Manila branch office Visit to Japanese Embassy Visit to Dr. R. L. Kintanar – Director-General, P A G A S A
	22 (Thu)	Joint meeting of survey team, telecommunication expert (PAGASA Mr. H. Osawa), TCS (Mr. C. H. Tang, Mr. O. Machida and PAGASA (Mr. J. F. Lirios, Mr. S. F. Fontano, Mr. M. Asuncion, Mr. V. Tio Jr. Mr. R. Bito-On, Mr. K. Garcia, Mr. F. Datoc. Obtaining of the 1 by 50,000 topographical maps in the Philippines at BCGS and other materials. Unpacking and checking up of the survey equipments and requisites.
	23 (Fri)	Running test of the communication equipments and check up of the requisites Remarking of the day's schedule plan of survey work Preparation of the survey in Calayan and Basco Obtaining of the materials
	24 (Sat)	H o l i d a y
	25 (Sun)	Obtaining of the materials
	26 (Mon)	Group–B travel to Calayan and Basco (Mr. Fuji, Mr. Suzuki, Mr. Osawa and counterparts) and boarded the naval ship from San Fernando Group–A prepare the profiles, and design the radio communication circuits (Tuguegarao – Gattaran, Tuguegarao – Aparri) (Mr. Fukui, Mr. Igarashi and counterparts) Preparation of the survey in Tuguegarao, Gattaran and Aparri Obtaining of the materials
	27 (Tue)	Group–A ditto Group–B came back to San Fernando owing to the accident of the ship and storm
	28 (Wed)	Group–A travel from Manila to Tuguegarao Group–B travel from San Fernando to Tuguegarao

Oct.	29	(Thu)	Survey of Tuguegarao FFS – sub center
	30	(Fri)	Group–A travel from Tuguegarao to Gattaran Propagation test between Tuguegarao and Gattaran Group–A travel from Gattaran to Aparri
	31	(Sat)	Propagation test between Tuguegarao and Aparri Survey of Aparri weather station
Nov.	1	(Sun)	Group–B travel from Tuguegarao to Aparri Survey of Aparri radar station
	2	(Mon)	Travel from Aparri to Tuguegarao
	3	(Tue)	Travel from Tuguegarao to Manila
	4	(Wed)	H o l i d a y
	5	(Thu)	Data collection, examination and adjustment Obtaining of the materials
	6	(Fri)	Meeting with counterparts Data collection and adjustment Obtaining of the materials
	7	(Sat)	Obtaining of the materials
	8	(Sun)	H o l i d a y
	9	(Mon)	Survey of communication system at PAGASA central office, Diliman communication station and TMRDO
	10	(Tue)	Lecture on designing of radio communication circuit for counterparts Data collection and adjustment of survey Obtaining of the materials
	11	(Wed)	d i t t o Preparation of profiles (Naga–Legaspi, Naga–Daet, Tanay–Tayabas, Carmen–Baler)
	12	(Thu)	Designing the radio communication circuits
	13	(Fri)	Discussion with counterparts Preparation of the equipments and requisites

Nov.	14 (Sat)	Holiday
	15 (Sun)	Obtaining of the materials
	16 (Mon)	Group–A travel from Manila to Legaspi Group–B travel from Manila to Naga
	17 (Tue)	Propagation test between Legaspi and Naga Survey of Legaspi weather station and Naga FFS sub-center
	18 (Wed)	Group–A travel from Legaspi to Naga
	19 (Thu)	Group–B travel from Naga to Daet Typhoon "Yeyeng" pass thru Naga
	20 (Fri)	Propagation test between Naga and Daet Survey of Daet weather station
	21 (Sat)	Group–A travel from Naga to Tayabas Group–B travel from Daet to Tanay
	22 (Sun)	Propagation test between Tayabas and Tanay Survey of Tayabas weather station and Tanay FFS repeater station Travel to Manila
	23 (Mon)	Holiday
	24 (Tue)	Preparation of profiles and designing the radio communication circuits (Muñoz–Baler, Iba–Carmen) Data collection and adjustment of survey – Typhoon "Anding" passed central Luzon
	25 (Wed)	Discussion with counterparts Preparation of the equipments and requisites Data collection, examination and adjustment
	26 (Thu)	Group–A travel from Manila to Iba Group–B travel from Manila to Carmen
	27 (Fri)	Propagation test between Iba and Carmen Survey of Iba Weather Station and Carmen FFS – sub-center
	28 (Sat)	Transport of the equipments and requisites to Manila Trip to Baguio

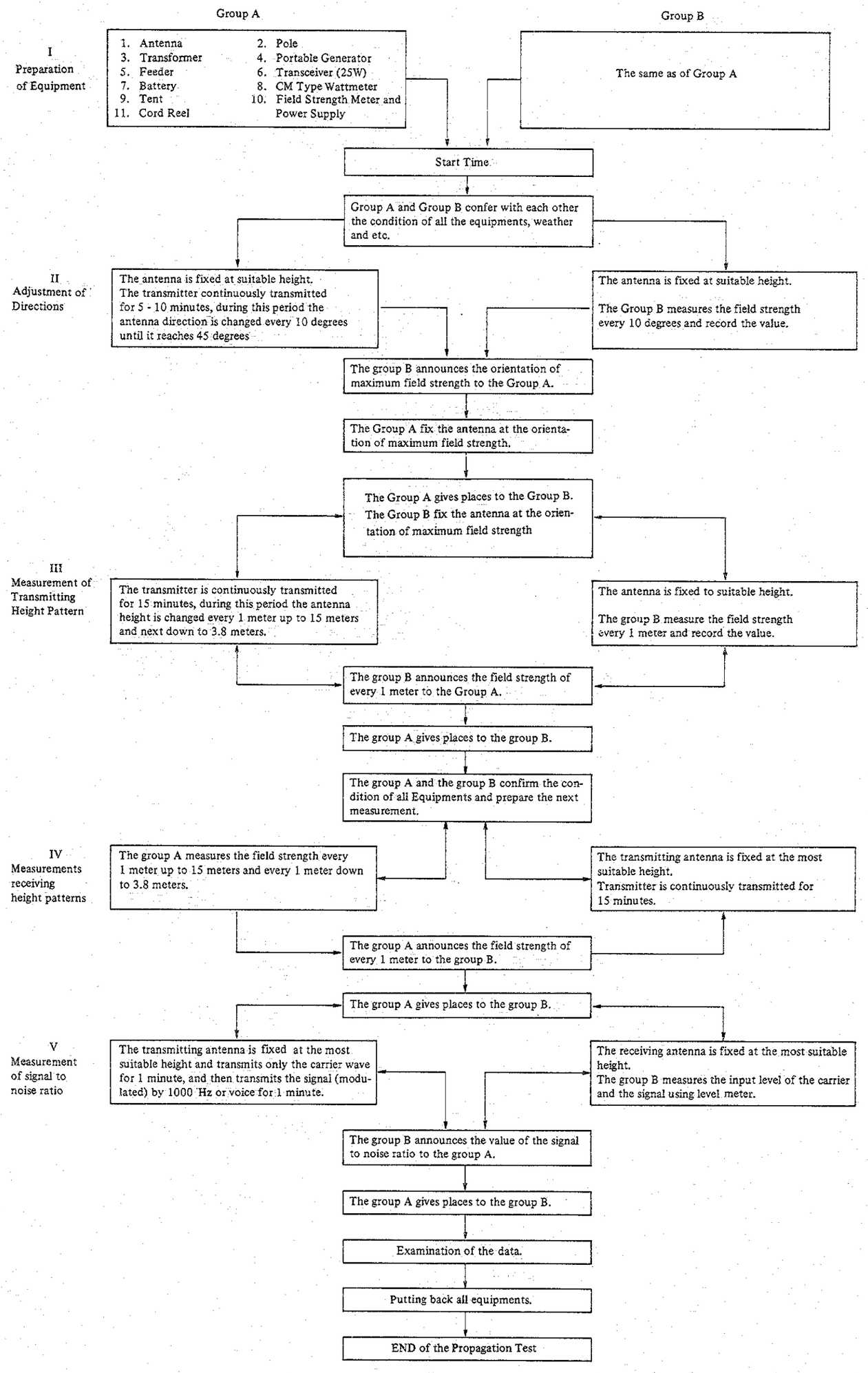
Nov.	29	(Sun)	Survey in Baguio Travel to Manila from Baguio
	30	(Mon)	H o l i d a y
Dec.	1	(Tue)	Discussion with counterparts Data collection and adjustment
	2	(Wed)	Travel to Cebu (Mr. Fukui, Mr. Fujii, Mr. Igarashi, Mr. Suzuki, Mr. Osawa, Mr. Fontano and Mr. Tio) Survey of Cebu weather station
	3	(Thu)	Survey of Cebu weather station
	4	(Fri)	Travel from Cebu to Davao Survey of Davao weather station
	5	(Sat)	Travel from Davao to Zamboanga
	6	(Sun)	Survey of Zamboanga weather station
	7	(Mon)	Travel from Zamboanga to Manila
	8	(Tue)	Data collection, examination and adjustment Preparation of the interim report for the survey work
	9	(Wed)	d i t t o
	10	(Thu)	d i t t o
	11	(Fri)	d i t t o discussion with PAGASA's communication, forecasting and observation experts (Mr. M. Asuncion, Mr. S. F. Fontano, Mr. V. Tio Jr., Mr. R. Bitoon, Mr. A. D. Makanas, Mr. G. F. Galang.)
	12	(Sat)	H o l i d a y
	13	(Sun)	H o l i d a y
	14	(Mon)	Preparation of the interim report for the survey work
	15	(Tue)	d i t t o
	16	(Wed)	Discussion with TCS
	17	(Thu)	Final meeting with PAGASA
	18	(Fri)	Visit to Japanese Embassy and JICA
	19	(Sat)	Travel to Tokyo

APPENDIX II

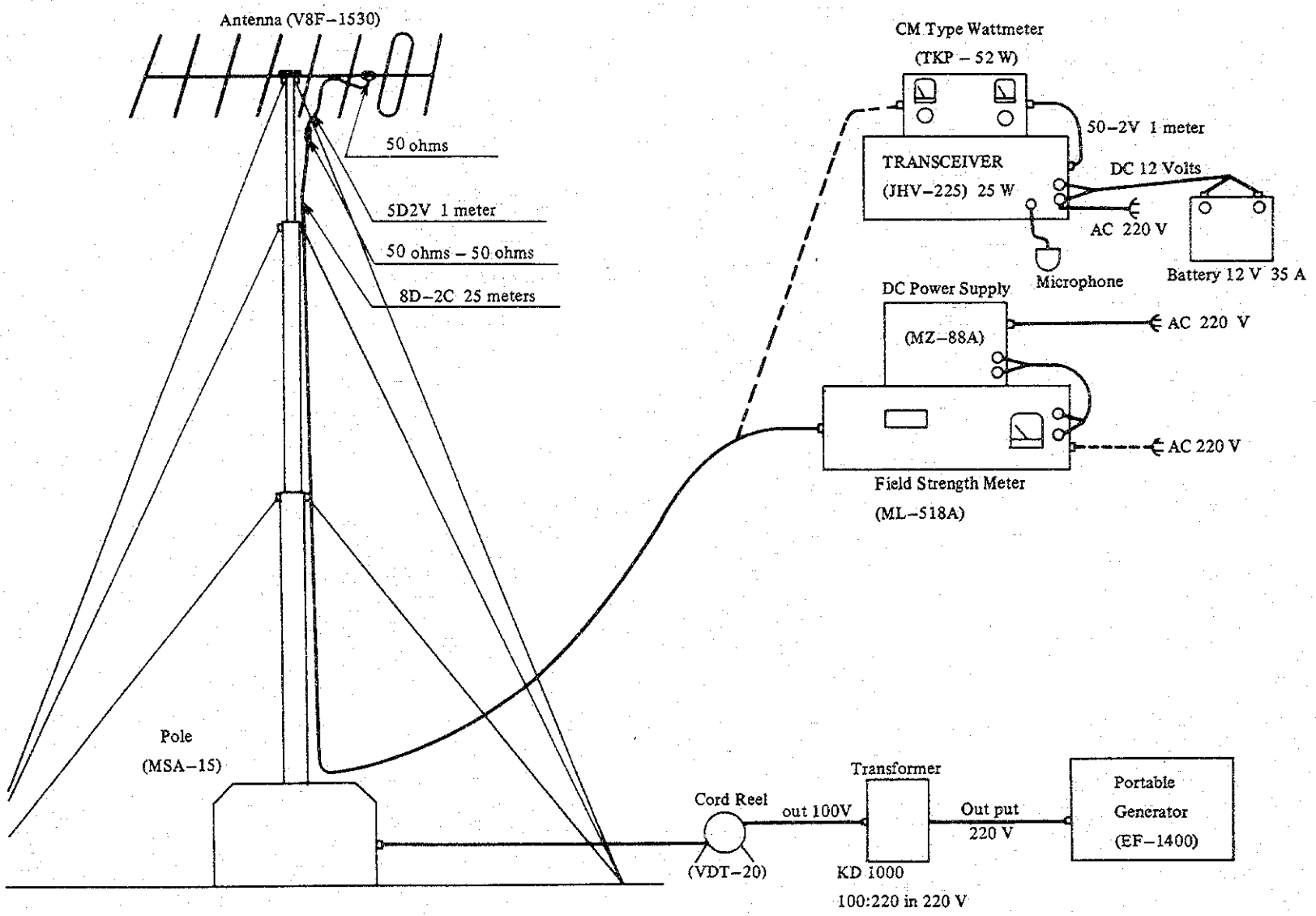
THE PROCEDURE OF FIELD STRENGTH MEASUREMENT OF VHF RADIO WAVE

THE PROCEDURE OF FIELD STRENGTH MEASUREMENT OF V H F RADIO WAVE

Note: Group A and Group B make an arrangement for a number of call channel and start time of test.



BLOCK DIAGRAM OF THE FIELD STRENGTH MEASUREMENTS SYSTEM

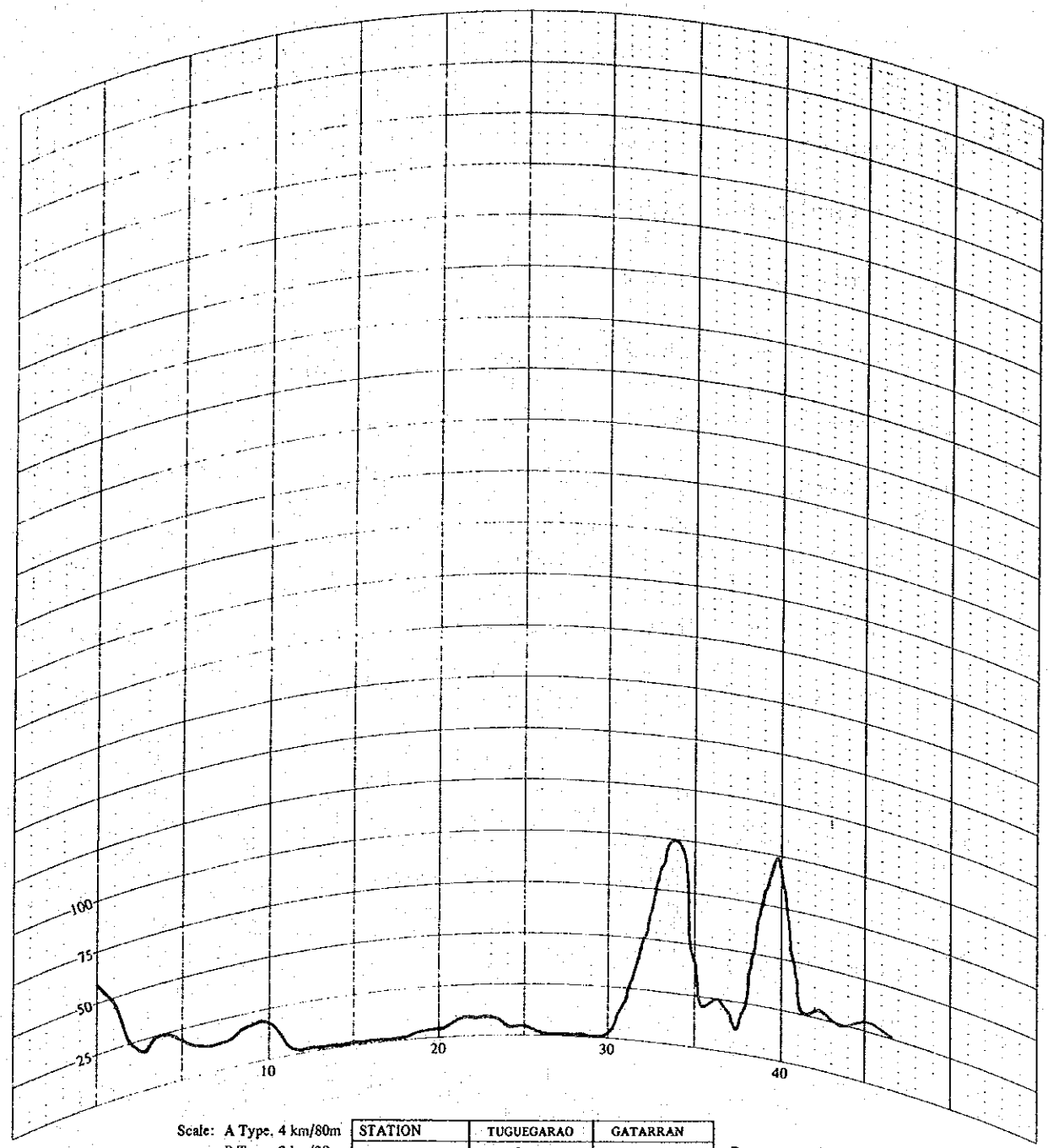


APPENDIX III

RESULT OF THE PROPAGATION TESTS FOR VHF LINK

CONTENTS

PROFILE



Scale: A Type. 4 km/80m
B Type. 2 km/20m
(C Type) 1 km/ 5m

STATION	TUGUEGARAO		GATARRAN	
PLACE	SUB CENTER			
	N	18° 21	N	UNKNOWN
	E	121° 39	E	
HEIGHT(M.S.L)	61 m		30 m	
DISTANCE	46.6 km			

Date: 27 Oct. 1981

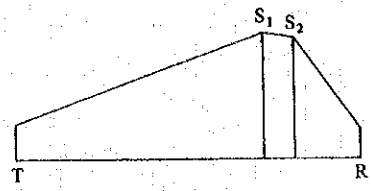
No. 1

TUGUEGARAO – GATTARAN LEVEL DIAGRAM FOR DESIGNING THE RADIO COMMUNICATION CIRCUIT( )

Number of Profile ( )

No. 1

Height (MSL)	61	m	Height (MSL)	30	m
Height of Antenna	15	m	Height of Antenna	15	m
Total Height	76	m	Total Height	45	m



(TUGUEGARAO) ← 46.6 km → (GATTARAN)

Items		Estimated Level Diagram			Level Diagram of Propergation Test		
		Calculated Value	Corrected Value	Remarks	Calculated Value	Measured Value	Remarks
Feeder Loss (Tx)	db	- 2.5	- 2.5	m	- 2.5	←	8D–2V 25 m
Antenna Gain (Tx)	db	11.0	11.0		11.0	←	
Free Space Loss	db	- 109.3	- 109.3		- 109.3	←	
Additional Loss	S1 db	- 23.4			- 23.4		
	S2 db	- 15.7	- 39.1		- 15.7	- 39.1	
	S3 db						
	db		- 1.5			(- 1.5)	Compensatory Value
Antenna Gain (Rx)	db	11.0	11.0		11.0	←	
Feeder Loss (Rx)	db	- 2.5	- 2.5	m	- 2.5	←	8D–2V 25 m
Loss of Others	db						
Total Loss	db	- 131.4	- 132.9		- 131.4	- 132.9	
Transmitting Power	db/w	13.98	13.98	25 W	13.98	13.98	25 w
Receiving Power	db/w	- 117.42	- 118.9		(1) -117.4 db/w	(2)-118.9 db/w	
Threshold Level	db/w	- 144.7	- 144.7	B 12 KHz F 9.5 db	(1) 25.3 db/μ (2) 23.8 db/μ		
Threshold Margin	db	27.28	25.8		- 1.5 db/μ		
Threshold S/N	db	21.2	21.2	mo r/ch B KHz			
Standard S/N	db	48.5	47.0				
Estimated Fading Loss	db	- 5.0	- 5.0	0.1 dB/km			
Frequency				150.20 MHz			

Measured Value of Field Strength	Antenna Height of	
	Receiver	Transmitter
21.1 db/μ	10 m	7 m
19.0		8
20.8		9
21.3		10
21.0		11
22.0		12
22.5		13
23.0		14
*23.8		15

(Received at TUGUEGARAO)

Remarks: $Pr = \frac{E^2\lambda^2}{480\pi^2} Gr \cdot \frac{1}{Lfr}$ [W]

$E\,[dB/\mu] = Pr[dB/W] - Gr[dB] + Lfr[dB] - 20 \log \lambda[m] + 156.3$

$Pr[dB/W] = E\,[dB/\mu] + Gr[dB] - Lfr[dB] + 20 \log \lambda[m] - 156.3$

Measured Date: D 30 M Oct. Y 1981

150.2 MHz

Instrument: Field Strength Meter ML-518A

Transmitter: FM Transceiver JHV-225

Noted Date: D 26 M Oct. Y 1981 Station:

TUGUEGARAO – GATTARAN MEASURED FIELD STRENGTH OF VHF RADIO WAVE (1)

Measured by Mr. Fujii, N. Suzuki, H. Osawa

Date: Week (Fri) Day 30 Month Oct. Year 1981 (Cloudy)

Frequency 150.20 MHz, MHz

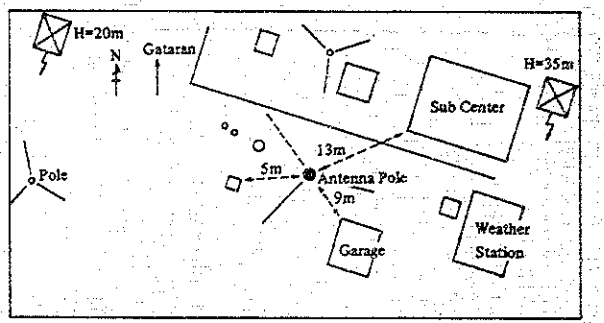
Measured at TUGUEGARAO Height (MSL) 61 m

Transmitted at GATTARAN Height (MSL) 30 m

Instrument: Field Strength Meter, Model: ML 518A (Anritsu)

Transmitter: FM Transceiver for 150 MHz 25W, Model: JHV–225 (JRC)

SKETCH OF MEASURING PLACE IN TUGUEGARAO



Time	Transmitting Station	Measured Field Strength Value (db)	Receiving Antenna: Polarization	Receiving Antenna: Type	Receiving Antenna: Height Above the Ground (m)	Receiving Antenna: Direction (deg.)	Receiving Antenna: Location	Receiving Antenna: Length of Coaxial Feeder (m)	Transmitting Antenna: Polarization	Transmitting Antenna: Type	Transmitting Antenna: Height Above the Ground (m)	Transmitting Antenna: Direction (deg.)	Transmitting Antenna: Location	Transmitting Antenna: Length of Coaxial Feeder (m)	Output Power: Forward Power (W)	Output Power: Reflected Power (W)
09:53	GATTARAN	* 23.5	H	8 ELE YAGI	10	350	See the Figure	25 (8D–2V) 2 (5D–2V)	H	8 ELE YAGI	* 3.80 up	175	About 46.6 km	25 (8D–2V) 1 (5D–2V)	24	0.2
		19.5					Tuguegarao Synoptic				5.0		To Tuguegarao			
		21.0					Station				6.0		N18°03'37" E121°38'26"			
		21.1					N 17°38'53" E121°45'34"				7.0					
		19.0									8.0					
		20.8									9.0					
		21.3									10.0					
		21.0									11.0					
		22.0									12.0					
		22.5									13.0					
		23.0									14.0					
10:00		* 23.8									* 15.0					

Remarks

Transmitting Antenna Height at Gattaran for Tuguegarao (up)

* The Maximum Value
(1) 23.8 [dB/μ], 15 [m]
(2) 23.5 [dB/μ], 3.8 [m]

TUGUEGARAO – GATTARAN MEASURED FIELD STRENGTH OF VHF RADIO WAVE (2)

Week Day Month Year
Date: (Fri.) 30 Oct. 1981 (Cloudy)

Measured by M. Fujii, N. Suzuki, H. Osawa

Frequency 150.20 MHz, MHz

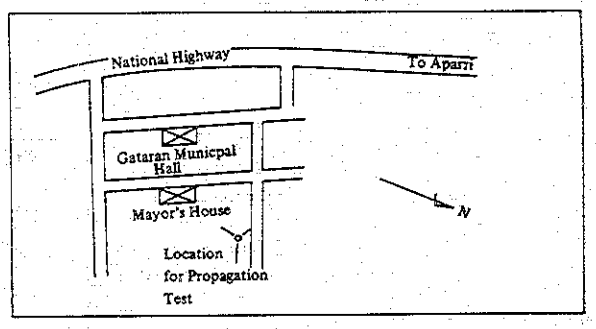
Measured at TUGUEGARAO Height (MSL) 61 m

Transmitted at GATTARAN Height (MSL) 30 m

Instrument Field Strength Meter Model: ML 518A (Anritsu)

Transmitter FM Transceiver for 150 MHz 25W Model: JHV–225 (JRC)

SKETCH OF MEASURING PLACE IN GATTARAN



Time	Transmitting Station	Measured Field Strength Value (db)	Receiving Antenna: Polarization	Receiving Antenna: Type	Receiving Antenna: Height Above the Ground (m)	Receiving Antenna: Direction (deg.)	Receiving Antenna: Location	Receiving Antenna: Length of Coaxial Feeder (m)	Transmitting Antenna: Polarization	Transmitting Antenna: Type	Transmitting Antenna: Height Above the Ground (m)	Transmitting Antenna: Direction (deg.)	Transmitting Antenna: Location	Transmitting Antenna: Length of Coaxial Feeder (m)	Output Power: Forward Power (W)	Output Power: Reflected Power (W)
10:00	GATTARAN	* 23.0	H	8 ELE YAGI	10	350	Tuguegarao	25 (8D–2V) 2 (5D–2V)	H	8 ELE YAGI	* down 15.0	175	GATTARAN	25 (8D–2V) 1 (5D–2V)	24.0	0.2
		22.5									14.0					
		21.5									13.0					
		21.0									12.0					
		19.5									11.0					
		19.5									10.0					
		19.7									9.0					
		18.5									8.0					
		21.0									7.0					
		21.7									6.0					
		21.5									5.0					
10:05		* 23.0									* 3.8					

Remarks

Transmitting Antenna Height at Gattaran for Tuguegarao (down)

* The Maximum Value
(1) 23.0 [dB/μ], 15 [m]
(2) 23.0 [dB/μ], 3.8 [m]

TUGUEGARAO— GATTARAN MEASURED FIELD STRENGTH OF VHF RADIO WAVE (3)

SKETCH OF MEASURING PLACE IN –

Week Day Month Year
Date: (Fri.) 30 Oct. 1981 (Fine)

Measured by M. Igarashi, T. Fukui

Frequency 150.20 MHz, MHz

Measured at GATTARAN Height (MSL) 30 m

Transmitted at TUGUEGARAO Height (MSL) 61 m

Instrument Field Strength Meter Model: ML 518A (Anritsu)

Transmitter FM Transceiver for 150 MHz 25W Model: JHV–225 (JRC)

Time	Transmitting Station	Measured Field Strength Value (db)	Receiving Antenna						Transmitting Antenna						Output Power	
			Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Forward Power (W)	Reflected Power (W)
10:20	Tuguegarao	* 23.2	H	8 ELE YAGI	3.8	175	GATTARAN	25 (8D–2V) 1 (5D–2V)	H	8 ELE YAGI	* up 3.8	350	Tuguegarao Synoptic Station	25 (8D–2V) 2 (5D–2V)	23.0	0.2
		19.2									5.0					
		20.7									6.0					
		20.8									7.0					
		18.7									8.0					
		20.5									9.0					
		21.0									11.0					
		20.7									11.0					
		21.7									12.0					
		22.2									13.0					
		22.7									14.0					
10:27		23.5									15.0					

Remarks

Transmitting Antenna Height at Tuguegarao for Gattaran (up)

* The Maximum Value
23.5 [dB/μ] , 15 [m]

TUGUEGARAO—GATTARAN MEASURED FIELD STRENGTH OF VHF RADIO WAVE (4)

SKETCH OF MEASURING PLACE IN -

Week Day Month Year
Date: (Fri.) 30 Oct. 1981 (Fine)

Measured by M. Igarashi, T. Fukui

Frequency 150.20 MHz, MHz

Measured at GATTARAN Height (MSL) 30 m

Transmitted at TUGUEGARAO Height (MSL) 61 m

Instrument: Field Strength Meter, Model: ML 518A (Anritsu)

Transmitter: FM Transceiver for 150 MHz 25W, Model: JHV–225 (JRC)

Time	Transmitting Station	Measured Field Strength Value (db)	Receiving Antenna: Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Transmitting Antenna: Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Output Power: Forward Power (W)	Reflected Power (W)
10:27	Tuguegarao	* 23.5	H	8 ELE YAGI	3.8	175	GATTARAN	25 (8D–2V) 1 (5D–2V)	H	8 ELE YAGI	* 15.0	350	Tuguegarao	25 (8D–2V) 2 (5D–2V)	24.0	0.2
		22.2									14.0					
		21.2									13.0					
		20.7									12.0					
		19.2									11.0					
		19.2									10.0					
		19.4									9.0					
		18.2									8.0					
		20.7									7.0					
		21.4									6.0					
		21.2									5.0					
10:35		22.7									3.8					

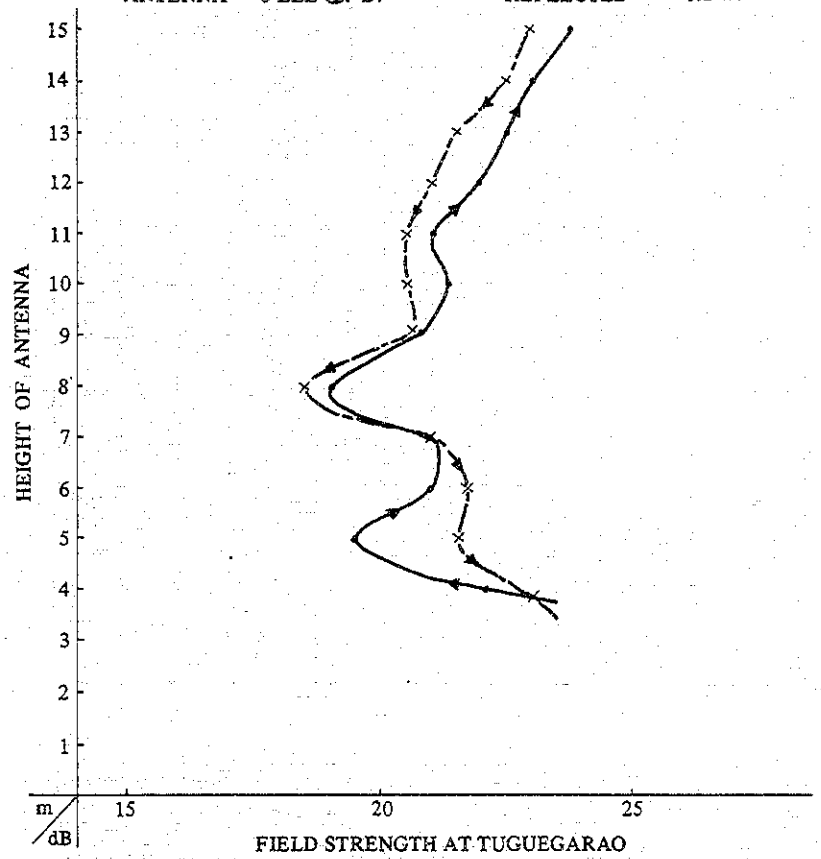
Remarks

Transmitting Antenna Height at Tuguegarao for Gattaran (down)

* The Maximum Value
23.5 [dB/μ], 15 [m]

TUGUEGARAO – GATTARAN HEIGHT PATTERN OF FIELD STRENGTH

TRANSMITTING POWER
FREQUENCY 150.20 NHz FORWORD 24.0 W.
ANTENNA 8 ELE Ⓨ D. REFLECTED 0.2 W.



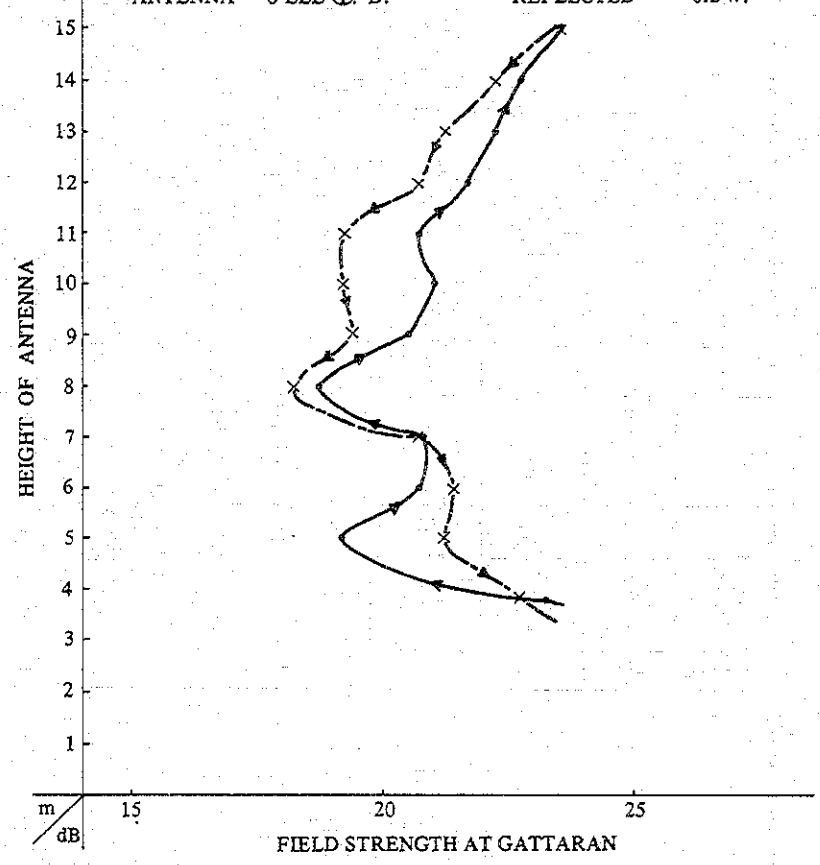
TRANSMITTING ANTENNA HEIGHT AT
GATTARAN FOR TUGUEGARAO F.S.M.

INSTRUMENT ML 518A (ANRITSU)

MEASURED DATE D 30 M OCT. Y 1981 MEASURER FUJII, SUZUKI, OSAWA

TUGUEGARAO – GATTARAN HEIGHT PATTERN OF FIELD STRENGTH

TRANSMITTING POWER
FREQUENCY 150.20 MHz FORWORD 23.0 W.
ANTENNA 8 ELE Ⓨ D. REFLECTED 0.2 W.

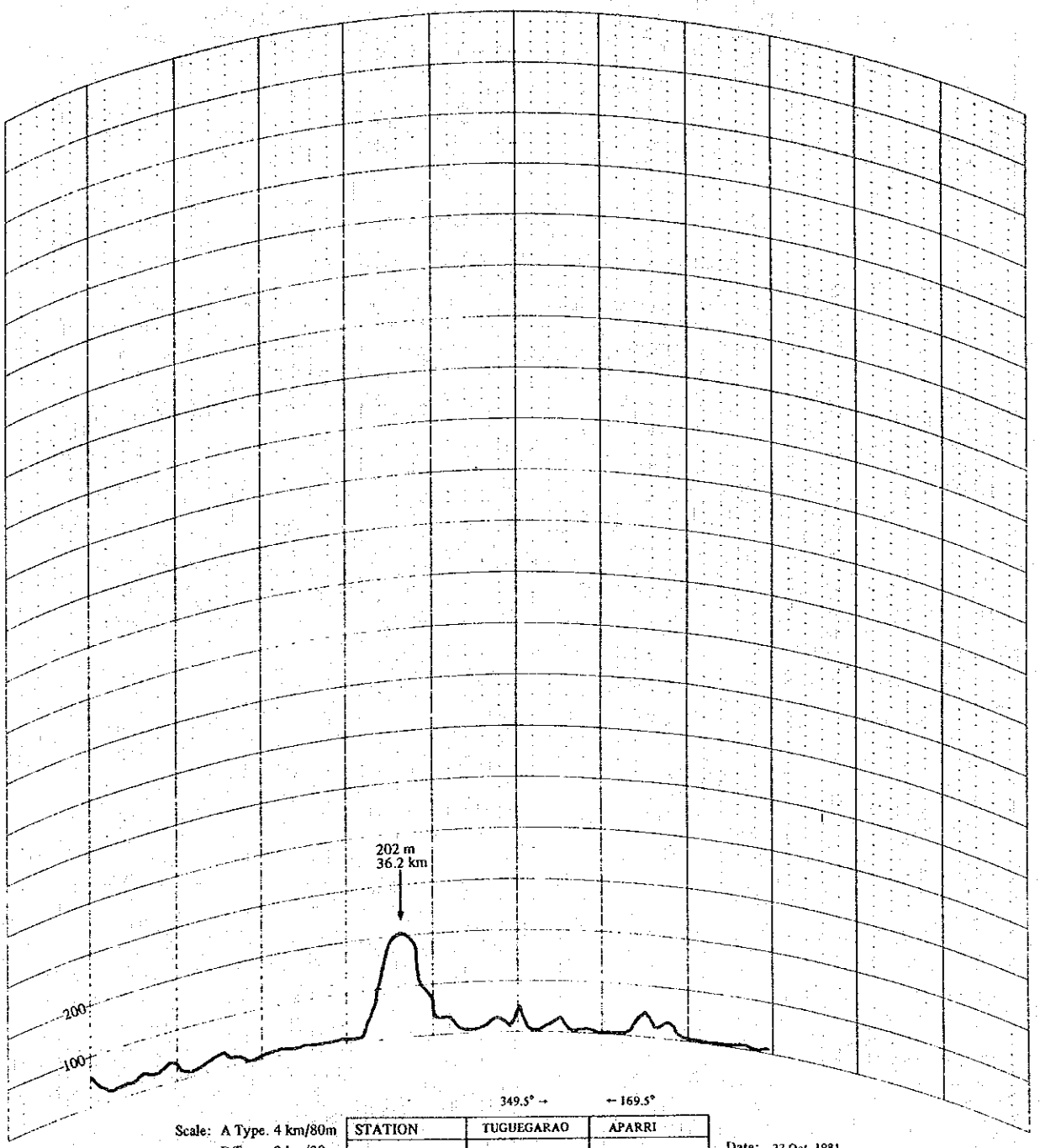


TRANSMITTING ANTENNA HEIGHT AT
TUGUEGARAO FOR GATTARAN F.S.M.

INSTRUMENT MI 518A (ANRITSU)

MEASURED DATE D 30 M OCT. Y 1981 MEASURER FUKUI, IGARASHI

PROFILE



349.5° → ← 169.5°

Scale: A Type. 4 km/80m
B Type. 2 km/20m
C Type. 1 km/ 5m

STATION	TUGUEGARAO	APARRI
PLACE	N 17° 38' 53"	N 18° 21' 43"
	E 121° 45' 34"	E 121° 37' 45"
HEIGHT(M.S.L)	61 m	2 m
DISTANCE	79.4 km	

Date: 27 Oct. 1981

No. 2

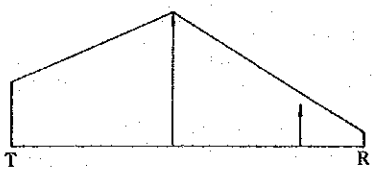
TUGUEGARAO – APARRI LEVEL DIAGRAM FOR DESIGNING THE RADIO COMMUNICATION CIRCUIT ( )

Number of Profile
( )

No. 2

Height (MSL)	61	m
Height of Antenna	15	m
Total Height	76	m

Height (MSL)	2	m
Height of Antenna	15	m
Total Height	17	m



(TUGUEGARAO) ← 79.4 km → (APARRI)

Items		Estimated Level Diagram			Level Diagram of Propergation Test		
		Calculated Value	Corrected Value	Remarks	Calculated Value	Measured Value	Remarks
Feeder Loss (Tx)	db	- 2.5	- 2.5	m	- 2.5	←	8D–2V 25 m
Antenna Gain (Tx)	db	11.0	11.0		11.0	←	
Free Space Loss	db	- 113.0	- 113.0		- 113.0	←	
Additional Loss	S1 db	- 20.5			- 20.5		
	S2 db	- 3.4	- 33.9		- 3.4		
	S3 db					- 33.9	
	db	- 10.0	- 1.5		- 10.0	(- 1.5)	Compensatory Value
Antenna Gain (Rx)	db	11.0	11.0		11.0	←	
Feeder Loss (Rx)	db	- 2.7	- 2.8	m	- 2.7	2.8	8D–2V 25 m 5D–2V 1 m
Loss of Others	db						
Total Loss	db	- 130.1	- 131.7		- 130.1	- 131.7	
Transmitting Power	db/w	13.98	13.98	25 w	13.98	13.98	25 w
Receiving Power	db/w	- 116.2	- 117.72		(1) - 116.2db/w	(2) - 117.7[dB/W]	
Threshold Level	db/w	- 144.7	- 144.7	B 12 KHz F 9.5 db	(1) 26.5 db/μ (2) 25.0 db/μ		
Threshold Margin	db	28.0	26.98		- 1.5 db/μ		
Threshold S/N	db	21.2	21.2	mo r/ch B KHz			
Standard S/N	db	49.2	48.18				
Estimated Fading Loss	db	- 8.0	- 8.0	0.1 dB/km			
Frequency				150.20 MHz			

S/N = 48 [dB]

Measured Value of Field Strength	Antenna Height of Receiver	Antenna Height of Transmitter
24.0	14 m	15 m
25.0		14
24.5		13
24.0		12
22.0		11
19.0		10
17.5		8
16.0		9
13.0		7

(Received at TUGUEGARAO)

Remarks:

Measured Date: D 31 M Oct. Y 1981

Instrument: Field Strength Meter ML–518A
Transmitter: FM Transceiver JHV–225

Noted Date: D 26 M Oct. Y 1981 Station:

TUGUEGARAO—APARRI MEASURED FIELD STRENGTH OF VHF RADIO WAVE (1)

Measured by Fukui, Igarashi & 4 others

Date: Week (Sat.) Day 31 Month Oct. Year 1981 ( )

Frequency 150.20 MHz, MHz

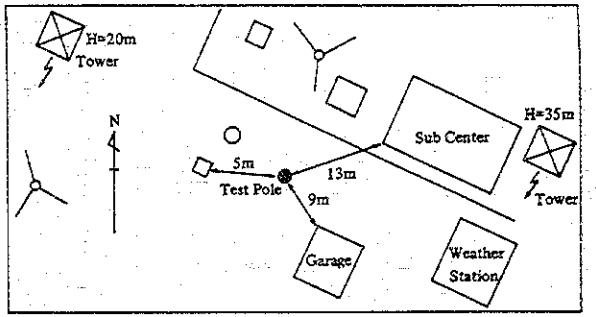
Measured at APARRI N 18°21'43" E121°37'45" Height (MSL) 3 m

Transmitted at TUGUEGARAO N 17°38'53" E121°45'34" Height (MSL) 61 m

Instrument Field Strength Meter Model: ML 518A (Anritsu)

Transmitter FM Transceiver for 150 MHz 25W Model: JHV-225 (JRC)

SKETCH OF MEASURING PLACE IN TUGUEGARAO



Time	Transmitting Station	Measured Field Strength Value (db)	Receiving Antenna: Polarization	Receiving Antenna: Type	Receiving Antenna: Height Above the Ground (m)	Receiving Antenna: Direction (deg.)	Receiving Antenna: Location	Receiving Antenna: Length of Coaxial Feeder (m)	Transmitting Antenna: Polarization	Transmitting Antenna: Type	Transmitting Antenna: Height Above the Ground (m)	Transmitting Antenna: Direction (deg.)	Transmitting Antenna: Location	Transmitting Antenna: Length of Coaxial Feeder (m)	Output Power: Forward Power (W)	Output Power: Reflected Power (W)
10:15	Tuguegarao	9.2	H	8 ELE YAGI	10	180	Aparri Synoptic Station 79.4 km to Tuguegarao N 18°21'43" E121°37'45"	25 (8D–2V) 1 (5D–2V)	H	8 ELE YAGI	3.8	355	Tuguegarao Synoptic Station N 17°38'53" E121°45'34"	25 (8D–2V) 2 (5D–2V)	24	0.1
		10.2									4.0					
		12.2									5.0					
		10.2									6.0					
		12.2									7.0					
		17.2									8.0					
		19.7									9.0					
		16.2									10.0					
		18.7									11.0					
		19.2									12.0					
		20.7									13.0					
		21.2									14.0					
10:22		* 21.5									15.0					

Remarks

Transmitting Antenna Height at Tuguegarao for Aparri (up)

* The Maximum Value
21.5 [dB/μ], 15 [m]

TUGUEGARAO—APARRI MEASURED FIELD STRENGTH OF VHF RADIO WAVE (2)

Week Day Month Year
Date: (Sat.) 31 Oct. 1981

Measured by Fukui, Igarashi & 4 others

Frequency 150.20 MHz, MHz

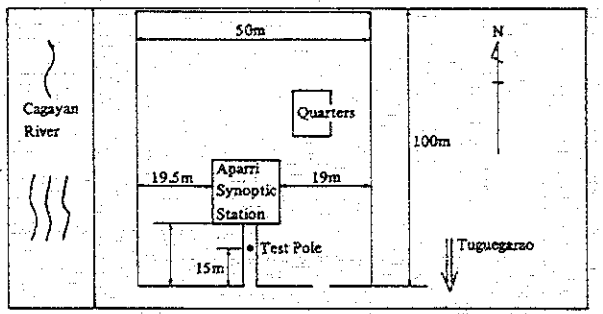
Measured at APARRI Height (MSL) 3 m

Transmitted at TUGUEGARAO Height (MSL) 61 m

Instrument Field Strength Meter Model: ML 518A (Anritsu)

Transmitter FM Transceiver for 150 MHz 25W Model: JHV-225 (JRC)

SKETCH OF MEASURING PLACE IN APARRI



Time	Transmitting Station	Measured Field Strength Value (db)	Receiving Antenna						Transmitting Antenna						Output Power	
			Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Forward Power (W)	Reflected Power (W)
10:22	Tuguegarao	21.5	H	8 ELE YAGI	10	180	Aparri Synoptic Station	25 (8D–2V) 1 (5D–2V)	H	8 ELE YAGI	15.0	355	Tuguegarao Synoptic Station	25 (8D–2V) 2 (5D–2V)	24	0.1
		21.9									14.0					
		20.9									13.0					
		20.4									12.0					
		19.7									11.0					
		17.7									10.0					
		17.7									9.0					
		15.7									8.0					
		14.7									7.0					
		13.7									6.0					
		11.2									5.0					
		8.2									4.0					
10:30		10.7									3.8					

Remarks

Transmitting Antenna Height at Tuguegarao for Aparri (down)

* The Maximum Value
21.9 [dB/μ], 14 [m]

TUGUEGARAO—APARRI MEASURED FIELD STRENGTH OF VHF RADIO WAVE (3)

SKETCH OF MEASURING PLACE IN —

Date: Week (Sat.) Day 31 Month Oct. Year 1981 ( )

Measured by Fujii, Suzuki, Osawa & 5 others

Frequency 150.20 MHz, MHz

Measured at TUGUEGARAO Height (MSL) 61 m

Transmitted at APARRI Height (MSL) 3 m

Instrument Field Strength Meter Model: ML 518A (Anritsu)

Transmitter FM Transceiver for 150 MHz 25W Model: JHV–225 (JRC)

Time	Transmitting Station	Measured Field Strength Value (db)	Receiving Antenna						Transmitting Antenna						Output Power	
			Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Forward Power (W)	Reflected Power (W)
10:40	APARRI	12.5	H	8 ELE YAGI	14.0	355	Tuguegarao Synoptic Station	25 (8D–2V) 2 (5D–2V)	H	8 ELE YAGI	3.8	180	Aparri Synoptic Station	25 (8D–2V) 1 (5D–2V)	24	0.2
		13.0									4.0					
		14.0									5.0					
		17.5									6.0					
		19.5									7.0					
		17.5									8.0					
		19.0									9.0					
		19.5									10.0					
		23.0									11.0					
		24.0									12.0					
		24.0									13.0					
		* 24.5									14.0					
10:50		24.0									15.0					

Remarks

Transmitting Antenna Height at Aparri for Tuguegarao (up)

* The Maximum Value
24.5 [dB/μ] , 14 [m]

TUGUEGARAO—APARRI MEASURED FIELD STRENGTH OF VHF RADIO WAVE (4)

SKETCH OF MEASURING PLACE IN —

Measured by Fujii, Suzuki, Osawa & 5 others

Date: Week (Sat.) Day 31 Month Oct. Year 1981

Frequency 150.20 MHz, MHz

Measured at TUGUEGARAO Height (MSL) 61 m

Transmitted at APARRI Height (MSL) 3 m

Instrument: Field Strength Meter, Model: ML 518A (Anritsu)

Transmitter: FM Transceiver for 150 MHz 25W, Model: JHV–225 (JRC)

Time	Transmitting Station	Measured Field Strength Value (db)	Receiving Antenna						Transmitting Antenna						Output Power	
			Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Forward Power (W)	Reflected Power (W)
10:50	APARRI	24.0	H	8 ELE YAGI	14.0	355	Tuguegarao Synoptic Station	25 (8D–2V) 2 (5D–2V)	H	8 ELE YAGI	15.0	180	Aparri Synoptic Station	25 (8D–2V) 1 (5D–2V)	24	0.2
		* 25.0									14.0					
		24.5									13.0					
		24.0									12.0					
		22.0									11.0					
		19.5									10.0					
		19.5									9.0					
		17.5									8.0					
		16.0									7.0					
		15.5									6.0					
		13.0									5.0					
		13.0									4.0					
11:00		14.0									3.8					

Remarks

Transmitting Antenna Height at Aparri for Tuguegarao (down)

* The Maximum Value

25.0 [dB/μ], 14 [m]

TUGUEGARAO—APARRI MEASURED FIELD STRENGTH OF VHF RADIO WAVE (5)

SKETCH OF MEASURING PLACE IN —

Date: Week (Sat.) Day 31 Month Oct. Year 1981

Measured by Fukui, Igarashi & 4 others

Frequency 150.20 MHz, MHz

Measured at APARRI Height (MSL) 3 m

Transmitted at TUGUEGARAO Height (MSL) 61 m

Instrument Field Strength Meter Model: ML 518A (Anritsu)

Transmitter FM Transceiver for 150 MHz 25W Model: JHV-225 (JRC)

Time	Transmitting Station	Measured Field Strength Value (db)	Receiving Antenna						Transmitting Antenna						Output Power	
			Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Forward Power (W)	Reflected Power (W)
11:10	Tuguegarao	12.7	H	8 ELE YAGI	3.8	180	Aparri Synoptic Station	25 (8D–2V) 1 (5D–2V)	H	8 ELE YAGI	14.0	355	Tuguegarao Synoptic Station	25 (8D–2V) 2 (5D–2V)	23.0	0.05
		11.7			4.0											
		13.7			5.0											
		15.4			6.0											
		15.2			7.0											
		17.7			8.0											
		19.7			9.0											
		20.4			10.0											
		21.4			11.0											
		22.2			12.0											
		22.4			13.0											
		* 23.2			14.0											
11:15		22.8			15.0											

Remarks

Receiving Antenna Height at Aparri for Tuguegarao (up)

* The Maximum Value
23.2 [dB/μ] , 14 [m]

TUGUEGARAO—APARRI MEASURED FIELD STRENGTH OF VHF RADIO WAVE (6)

SKETCH OF MEASURING PLACE IN ——

Date: Week (Sat.) Day 31 Month Oct. Year 1981 ( )

Measured by Fukui, Igarashi & 4 others

Frequency 150.20 MHz, MHz

Measured at APARRI Height (MSL) 3 m

Transmitted at TUGUEGARAO Height (MSL) 61 m

Instrument Field Strength Meter Model: ML 518A (Anritsu)

Transmitter FM Transceiver for 150 MHz 25W Model: JHV–225 (JRC)

Time	Transmitting Station	Measured Field Strength Value (db)	Receiving Antenna						Transmitting Antenna						Output Power	
			Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Forward Power (W)	Reflected Power (W)
11:15	Tuguegarao	25.2	H	8 ELE YAGI	15.0	180	Aparri Synoptic Station	25 (8D–2V) 1 (5D–2V)	H	8 ELE YAGI	14.0	355	Tuguegarao Synoptic Station	25 (8D–2V) 2 (5D–2V)	23.0	0.05
		25.2			14.0											
		23.2			13.0											
		20.7			12.0											
		20.2			11.0											
		19.2			10.0											
		16.4			9.0											
		16.4			8.0											
		17.4			7.0											
		16.4			6.0											
		14.2			5.0											
		13.2			4.0											
11:20		12.2			3.8											

Remarks

Receiving Antenna Height at Aparri for Tuguegarao (down)

* The Maximum Value 25.2 [dB/μ], 15 [m] & 14 [m]

TUGUEGARAO—APARRI MEASURED FIELD STRENGTH OF VHF RADIO WAVE (7)

SKETCH OF MEASURING PLACE IN ——

Measured by Fujii, Suzuki, Osawa & 5 others

Week Day Month Year
Date: (Sat.) 31 Oct. 1981

Frequency 150.20 MHz, MHz

Measured at TUGUEGARAO Height (MSL) 61 m

Transmitted at APARRI Height (MSL) 3 m

Instrument Field Strength Meter Model: ML 518A (Anritsu)

Transmitter FM Transceiver for 150 MHz 25W Model: JHV--225 (JRC)

Time	Transmitting Station	Measured Field Strength Value (db)	Receiving Antenna						Transmitting Antenna						Output Power	
			Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Forward Power (W)	Reflected Power (W)
13:30	APARRI	25.7	H	8 ELE YAGI	15.0	355	Tuguegarao Synoptic	25 (8D–2V) 2 (5D–2V)	H	8 ELE YAGI	14.0	180	Aparri Synoptic	25 (8D–2V) 1 (5D–2V)	24	0.2
	↓	* 26.0	↓	↓	14.0	↓	Station	↓	↓	↓	↓	↓	Station	↓	↓	↓
		22.0			13.0											
		21.0			12.0											
		19.7			11.0											
		21.0			10.0											
		19.5			9.0											
		19.0			8.0											
		16.5			7.0											
		16.8			6.0											
		16.0			5.0											
		16.0			4.0											
13:40	↓	16.0	↓	↓	3.8	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓

Remarks

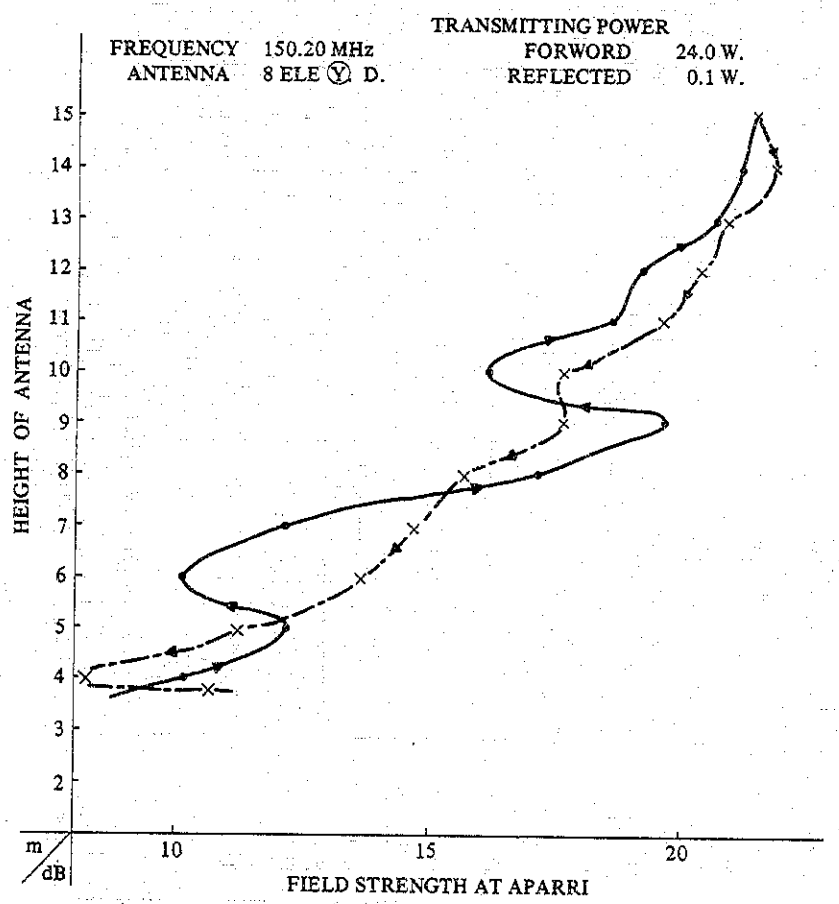
Receiving Antenna Height at Tuguegarao
for Aparri (down)

* The Maximum Value
26.0 [dB/μ], 14.0 [m]

S/N on the Maximum Value

N = - 2 [dB] Rx.ANT.H. = 14.0 m
Nc = - 48 [dB] S/N = 48 [dB] Tx.ANT.H = 14.0 m
S = 0 [dB]

TUGUEGARAO – APARRI HEIGHT PATTERN OF FIELD STRENGTH



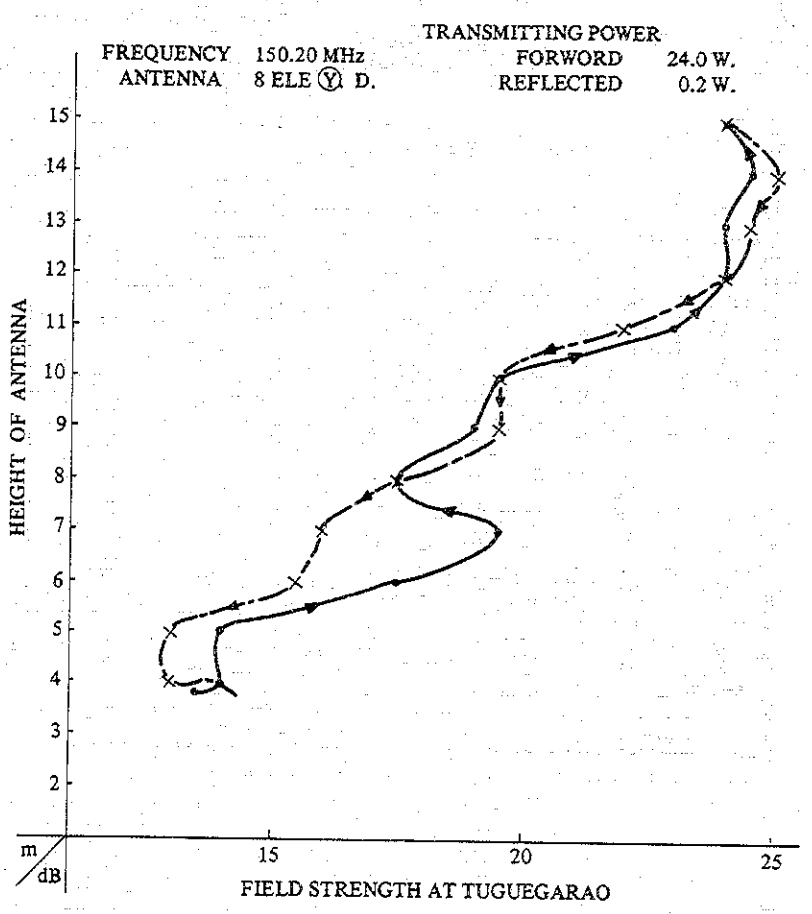
TRANSMITTING ANTENNA HEIGHT AT TUGUEGARAO FOR APARRI

F.S.M.

INSTRUMENT ML 518A (ANRITSU)

MEASURED DATE D 31 M OCT. Y 1981 MEASURER FUKUI, IGARASHI

TUGUEGARAO – APARRI HEIGHT PATTERN OF FIELD STRENGTH



TRANSMITTING ANTENNA HEIGHT AT APARRI FOR TUGUEGARAO

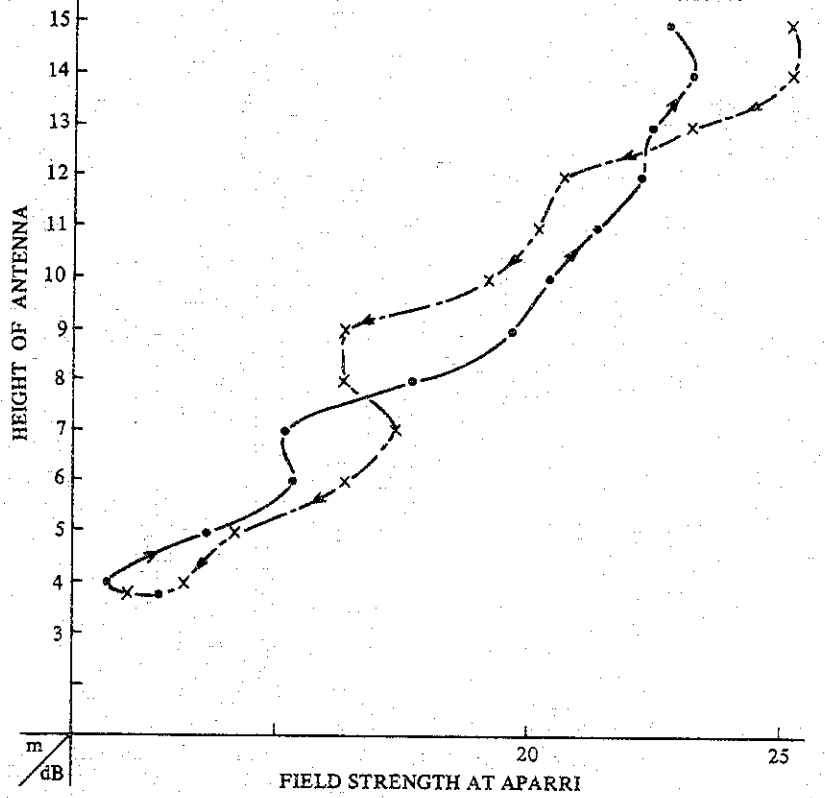
F.S.M.

INSTRUMENT ML 518A (ANRITSU)

MEASURED DATE D 31 M OCT. Y 1981 MEASURER FUJII, SUZUKI, OSAWA

TUGUEGARAO – APARRI HEIGHT PATTERN OF FIELD STRENGTH

TRANSMITTING POWER
FREQUENCY 150.20 MHz FORWORD 23.0 W.
ANTENNA 8 ELE Ⓨ D. REFLECTED 0.05 W.



RECEIVING ANTENNA HEIGHT AT APARRI FOR TUGUEGARAO

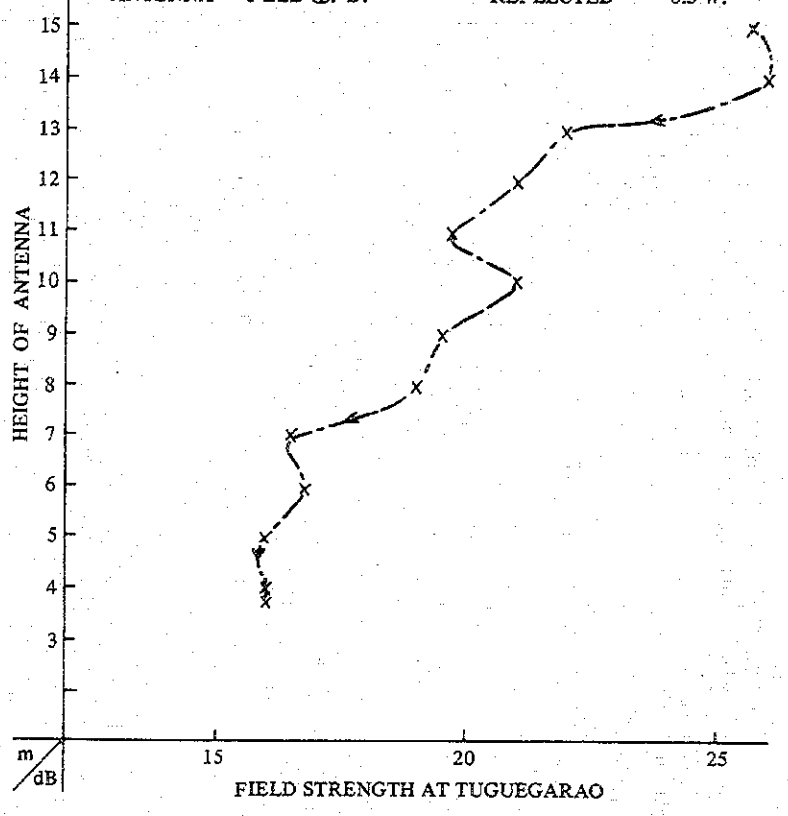
F.S.M.

INSTRUMENT ML 518A (ANRITSU)

MEASURED DATE D 31 M OCT. Y 1981 MEASURER FUKUI, IGARASHI

TUGUEGARAO – APARRI HEIGHT PATTERN OF FIELD STRENGTH

TRANSMITTING POWER
FREQUENCY 150.20 MHz FORWORD 24.0 W.
ANTENNA 8 ELE Ⓨ D. REFLECTED 0.5 W.



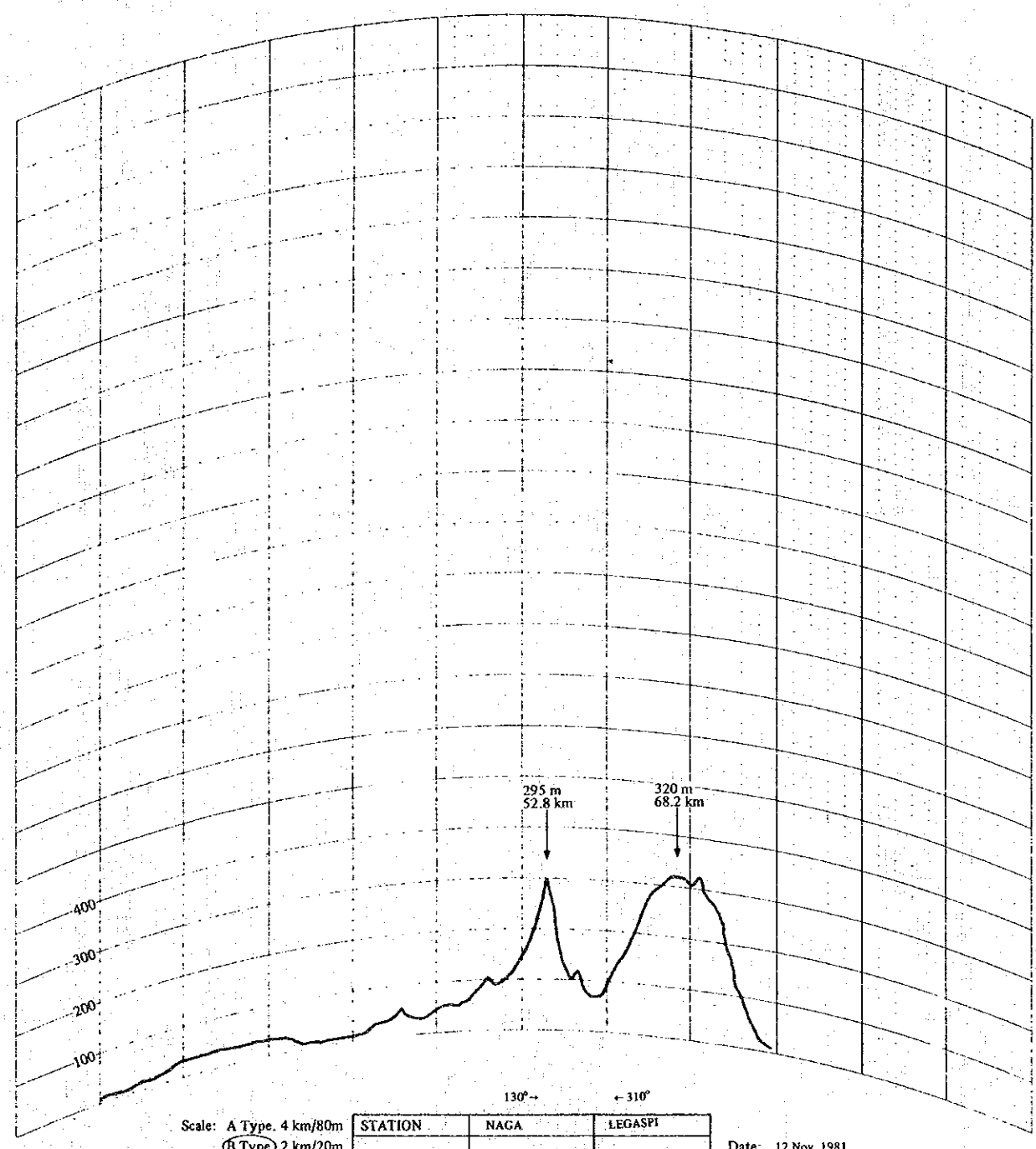
RECEIVING ANTENNA HEIGHT AT TUGUEGARAO FOR APARRI

F.S.M.

INSTRUMENT ML 518A (ANRITSU)

MEASURED DATE D 31 M OCT. Y 1981 MEASURER FUJII, SUZUKI

PROFILE



Scale: A Type. 4 km/80m
(B Type) 2 km/20m
C Type. 1 km/ 5m

STATION	NAGA		LEGASPI	
PLACE				
	N	13° 37' 21"	N	13° 08'
	E	123° 09' 56"	E	123° 44'
HEIGHT(M.S.L)	2 m		17 m	
DISTANCE	79.6 km			

Date: 12 Nov. 1981

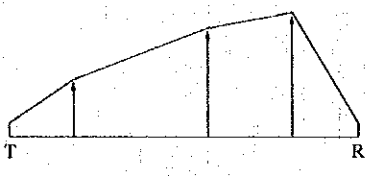
No. 3

NAGA – LEGASPI LEVEL DIAGRAM FOR DESIGNING THE RADIO COMMUNICATION CIRCUIT ( )

Number of Profile
( )

No. 3

Height (MSL)	2	m	Height (MSL)	17	m
Height of Antenna	15	m	Height of Antenna	15	m
Total Height	17	m	Total Height	32	m



(NAGA) ← 79.6 km → (LEGASPI)

Items		Estimated Level Diagram			Level Diagram of Propergation Test		
		Calculated Value	Corrected Value	Remarks	Calculated Value	Measured Value	Remarks
Feeder Loss (Tx)	db	- 2.5	- 2.5	m	- 2.5	←	8D–2V 25 m
Antenna Gain (Tx)	db	11.0	11.0		11.0	←	
Free Space Loss	db	- 113.98	- 113.98		- 113.98	←	
Additional Loss	S1 db	- 22.3			- 22.3		
	S2 db	- 13.0	- 44.9		- 13.0	- 44.9	
	S3 db	- 9.6			- 9.6		
	db		- 1.9			(- 1.9)	Compensatory Value
Antenna Gain (Rx)	db	11.0	11.0		11.0	←	
Feeder Loss (Rx)	db	- 2.5	- 4.6	m	- 2.5	- 4.6	8D–2V 50 m
Loss of Others	db						
Total Loss	db	- 141.88	- 145.88		- 141.88	- 145.88	
Transmitting Power	db/w	13.98	13.98	25 w	13.98	13.98	25 w
Receiving Power	db/w	- 127.9	- 131.9		(1) -127.9 db/w	(2) -131.9 [dB/W]	
					(1) 14.8 db/μ		
Threshold Level	db/w	- 144.7	- 144.7	B 12 KHz F 9.5 db	(2) 12.9 db/μ		
Threshold Margin	db	16.8	12.8		- 1.9 db/μ		
Threshold S/N	db	21.2	21.2	mo r/ch B KHz			
Standard S/N	db	38.0	34.0		S/N = 38 [dB]		
Estimated Fading Loss	db	-8	- 8	0.1 dB/km			
Frequency				150.20 MHz			

Measured Value of Field Strength	Antenna Height of Receiver	Antenna Height of Transmitter
12.9 [dB/μ]	30 [m]	8 [m]

(Received at NAGA)

Remarks:

Measured Date: D 17 M Nov. Y 1981
150.20 MHz

Instrument: Field Strength Meter ML–518A

Transmitter: FM Transceiver JHV–225

Noted Date: D 12 M Nov. Y 1981 Station:

LEGASPI—NAGA MEASURED FIELD STRENGTH OF VHF RADIO WAVE (1)

Date: Week (Tues.) Day 17 Month Nov. Year 1981 (Fair)

Measured at N 13°37'21" E123°09'56" NAGA Height (MSL) 2 m

Instrument Field Strength Meter Model: ML 518A (Anritsu)

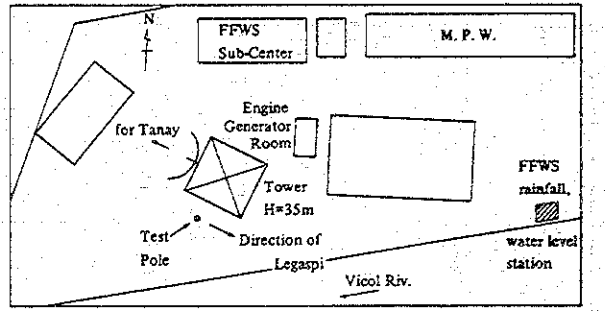
Measured by Fujii, Suzuki, Bito-On, Garcia, Prenda, Cruz

Frequency 150.20 MHz, MHz

Transmitted at N 13°08' E123°44' LEGASPI Height (MSL) 17 m

Transmitter FM Transceiver for VHF 150 MHz 25W JHV–225 (JRC)

SKETCH OF MEASURING PLACE IN NAGA



Time	Transmitting Station	Measured Field Strength Value (db)	Receiving Antenna: Polarization	Receiving Antenna: Type	Receiving Antenna: Height Above the Ground (m)	Receiving Antenna: Direction (deg.)	Receiving Antenna: Location	Receiving Antenna: Length of Coaxial Feeder (m)	Transmitting Antenna: Polarization	Transmitting Antenna: Type	Transmitting Antenna: Height Above the Ground (m)	Transmitting Antenna: Direction (deg.)	Transmitting Antenna: Location	Transmitting Antenna: Length of Coaxial Feeder (m)	Output Power: Forward Power (W)	Output Power: Reflected Power (W)
10:15	LEGASPI	5.7	H	8 ELE YAGI	15.0	142	FFWS Sub-Center (Camaligan)	25 (8D–2V) 1 (5D–2V)	H	8 ELE YAGI	8.0	330	Legaspi Weather Station	25 (8D–2V) 1 (5D–2V)	25.0	0.5
		* 7.2			14.0											
		4.2			13.0											
		6.2			12.0											
		6.7			11.0											
		6.2			10.0											
		5.7			9.0											
		3.2			8.0											
		3.7			7.0											
		2.7			6.0											
		4.2			5.0											
10:30		2.2			4.0											

Remarks

Receiving Antenna Height at Naga for Legaspi (down)

* Max. 7.2dB 14m

LEGASPI—NAGA MEASURED FIELD STRENGTH OF VHF RADIO WAVE (2)

Measured by Fujii, Suzuki, Bito-On, Garcia, Prenda, Cruz

Date: Week (Tues.) Day 17 Month Nov. Year 1981

Frequency 150.20 MHz, MHz

Measured at NAGA Height (MSL) 2 m

Transmitted at LEGASPI Height (MSL) 17 m

Instrument ML 518A

Transmitter JHC–225

SKETCH OF MEASURING PLACE IN —

See the Appendix IV.

Time	Transmitting Station	Measured Field Strength Value (db)	Receiving Antenna						Transmitting Antenna						Output Power	
			Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Forward Power (W)	Reflected Power (W)
10:30	LEGASPI	- 2.4	H	8 ELE YAGI	4.0	142	FFWS Sub-Center	25 (8D–2V) 1 (5D–2V)	H	8 ELE YAGI	8	330	Legaspi Weather	25 (8D–2V) 1 (5D–2V)	25.0	0.5
		2.2			5.0		(Camalican)						Station			
		4.2			6.0											
		5.2			7.0											
		2.2			8.0											
		4.7			9.0											
		2.2			10.0											
		4.2			11.0											
		4.2			12.0											
		6.2			13.0											
		* 7.2			14.0											
10:40		5.7			15.0											

Remarks

Receiving Antenna Height at Naga for Legaspi (up)

* Max.
7.2 dB, 14.0 m

LEGASPI—NAGA MEASURED FIELD STRENGTH OF VHF RADIO WAVE (3)

SKETCH OF MEASURING PLACE IN ——

Measured by Fujii, and 5 the others

Week Day Month Year
Date: (Tues.) 17 Nov. 1981 (Fair)

Frequency 150.20 MHz, MHz

Measured at NAGA Height (MSL) 2 m

Transmitted at LEGASPI Height (MSL) 17 m

Instrument ML 518A

Transmitter JHV–225

Time	Transmitting Station	Measured Field Strength Value (db)	Receiving Antenna						Transmitting Antenna						Output Power	
			Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Forward Power (W)	Reflected Power (W)
10:50	LEGASPI	4.2	H	8 ELE YAGI	14.0	142	FFWS Sub-Center	25 (8D–2V) 1 (5D–2V)	H	8 ELE YAGI	3.8	330	Legaspi Weather	25 (8D–2V) 1 (5D–2V)	25.0	0.5
		1.2			Best Receiving Height						4.0		Station			
		6.2									5.0					
		6.2									6.0					
		* 7.7									7.0					
		7.2									8.0					
		6.7									9.0					
		4.2									10.0	Remarks				
		2.2									11.0	Transmitting Antenna Height at Legaspi for Naga (up)				
		- 3.8									12.0					
		- 4.2									13.0	* Max. 7.7 db, 7.0 m				
		- 4.8									14.0					
11:05		- 3.8									15.0					

LEGASPI—NAGA MEASURED FIELD STRENGTH OF VHF RADIO WAVE (4)

SKETCH OF MEASURING PLACE IN ——

Measured by Fujii, and 5 the others

Week Day Month Year

Date: (Tues.) 17 Nov. 1981 (Fair)

Frequency 150.20 MHz, MHz

Measured at NAGA Height (MSL) 2 m

Transmitted at LEGASPI Height (MSL) 17 m

Instrument ML-518A

Transmitter JHV-225

Time	Transmitting Station	Measured Field Strength Value (db)	Receiving Antenna						Transmitting Antenna						Output Power	
			Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Forward Power (W)	Reflected Power (W)
11:05	LEGASPI	- 5.8	H	8 ELE YAGI	14.0	142	FFWS Sub-Center	25 (8D–2V) 1 (5D–2V)	H	8 ELE YAGI	14.0	330	Legaspi Weather	25 (8D–2V) 1 (5D–2V)	25.0	0.5
		- 3.3			Best Receiving Height						13.0		Station			
		- 4.8									12.0					
		+ 2.2									11.0					
		3.2									10.0					
		* 7.7									9.0					
		7.2									8.0					
		7.2									7.0					
		6.7									6.0					
		5.7									5.0					
		1.2									4.0					
11:20		2.2									3.8					

Remarks

Transmitting Antenna Height at Legaspi for Naga (down)

* Max. 7.7 db, 9.0 m

LEGASPI—NAGA MEASURED FIELD STRENGTH OF VHF RADIO WAVE (5)

SKETCH OF MEASURING PLACE IN ——

Measured by Fukui, Igarashi, Fontano, Maraña, Morales, and Santos

Week Day Month Year
Date: (Tues.) 17 Nov. 1981 (Fair)

Frequency 150.20 MHz, MHz

Measured at LEGASPI Height (MSL) 17 m

Transmitted at NAGA Height (MSL) 2 m

Instrument ML 518A

Transmitter JHV–225

Time	Transmitting Station	Measured Field Strength Value (db)	Receiving Antenna						Transmitting Antenna						Output Power	
			Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Forward Power (W)	Reflected Power (W)
13:15	NAGA	* 6.7	H	8 ELE YAGI	8.0	320	Legaspi Weather	25 (8D–2V) 1 (5D–2V)	H	8 ELE YAGI	14.0	142	FFWS Sub-Center	25 (8D–2V) 1 (5D–2V)	26.0	0.1
		4.7			Best Receiving Height		Station				13.0					
		4.2									12.0					
		3.2									11.0					
		4.2									10.0					
		3.7									9.0					
		2.2									8.0					
		2.2									7.0					
		0.2									6.0					
		2.2									5.0					
		2.2									4.0					
13:22		1.7			↓						3.8					

Remarks

Transmitting Antenna Height at Naga for Legaspi (down)

* Max. 6.7 dB, 14 m

LEGASPI—NAGA MEASURED FIELD STRENGTH OF VHF RADIO WAVE (6)

SKETCH OF MEASURING PLACE IN ——

Date: Week (Tues.) Day 17 Month Nov. Year 1981 (Fair)

Measured by Fukui, and 5 the others

Frequency 150.20 MHz, MHz

Measured at LEGASPI Height (MSL) 17 m

Transmitted at NAGA Height (MSL) 2 m

Instrument ML 518A

Transmitter JHV–225

Time	Transmitting Station	Measured Field Strength Value (db)	Receiving Antenna						Transmitting Antenna						Output Power	
			Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Forward Power (W)	Reflected Power (W)
13:30	NAGA	1.7	H	8 ELE YAGI	8.0	320	Legaspi Weather	25 (8D–2V) 1 (5D–2V)	H	8 ELE YAGI	5.0	142	FFWS Sub-Center	25 (8D–2V) 1 (5D–2V)	26.0	0.1
		3.2			Best Receiving Height		Station				6.0					
		5.7									7.0					
		2.2									8.0					
		3.2									9.0					
		3.2									10.0					
		3.2									11.0					
		4.2									12.0					
		5.7									13.0					
13:43		* 6.2									14.0					

Remarks

Transmitting Antenna Height at Naga for Legaspi (up)

* Max. 6.2 dB 14.0 m

LEGASPI—NAGA MEASURED FIELD STRENGTH OF VHF RADIO WAVE (7)

SKETCH OF MEASURING PLACE IN —

Measured by Fukui, and 5 the others

Week Day Month Year
Date: (Tues.) 17 Nov. 1981

Frequency 150.20 MHz, MHz

Measured at LEGASPI Height (MSL) 17 m

Transmitted at NAGA Height (MSL) 2 m

Instrument ML 518A

Transmitter JHV–225

Time	Transmitting Station	Measured Field Strength Value (db)	Receiving Antenna						Transmitting Antenna						Output Power	
			Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Forward Power (W)	Reflected Power (W)
13:42	NAGA	* 5.7	H	8 ELE YAGI	8.0	320	Legaspi Weather	25 (8D–2V) 1 (5D–2V)	H	8 ELE YAGI	14.0	142	NAGA	25 (8D–2V) 1 (5D–2V)	26.0	0.1
		4.2					Station				13.0					
		4.2									12.0					
		3.7									11.0					
		3.2									10.0					
		2.7									9.0					
		3.7									8.0					
		2.7									7.0					
		3.7									6.0					
		3.2									5.0					
		1.2									4.0					
13:50		1.2									3.8					

Remarks

Transmitting Antenna Height at Naga for Legaspi (down)

* Max. 5.7 dB 14.0 m

N = - 14 db
C = - 42 db
S = - 8 db
S/N = 34 db

Trans. Legaspi (25.0W) H = 8.0 m
Receiv. Naga H = 14.0 m

LEGASPI—NAGA MEASURED FIELD STRENGTH OF VHF RADIO WAVE (8)

SKETCH OF MEASURING PLACE IN ——

Measured by Fujii, and 5 the others

Date: Week (Tues.) Day 17 Month Nov. Year 1981 (Fair)

Frequency 150.20 MHz, MHz

Measured at Height (MSL)

Transmitted at Height (MSL)

Instrument ML 518A

Transmitter JHV–225

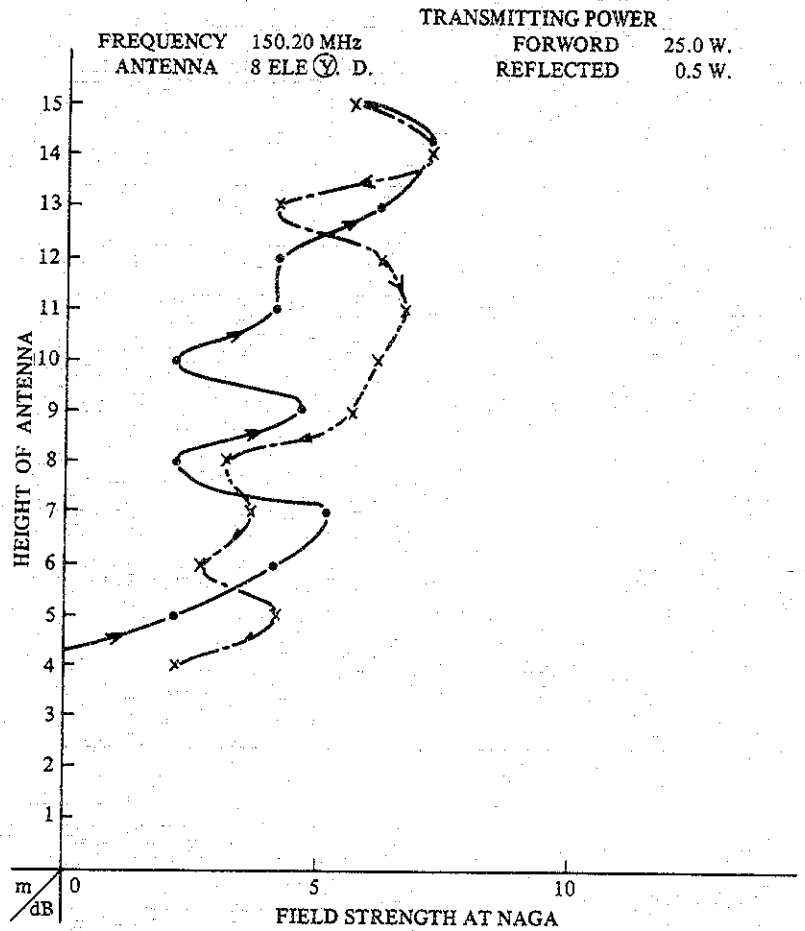
Time	Transmitting Station	Measured Field Strength Value (db)	Receiving Antenna						Transmitting Antenna						Output Power	
			Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Forward Power (W)	Reflected Power (W)
15:10	LEGASPI	12.9	H	8 ELE YAGI	30	140	Tower of Parabolic Antenna	50 (8D–2V) 1 (5D–2V)	H	8 ELE YAGI	8.0	320	Legaspi Weather Station	25 (8D–2V) 1 (5D–2V)	25.0	0 1
15:15	NAGA	8.6	H	8 ELE YAGI	8.0	320	Legaspi Weather Station	25 (8D–2V) 1 (5D–2V)	H	8 ELE YAGI	30	140	Tower of Parabolic Antenna	50 (8D–2V) 1 (5D–2V)	26.0	0 5

Remarks

N = - 13 db
C = - 44 db
S = - 6 db
S/N = 38 db

Trans. Legaspi (25.0W) H = 8.0 m
Receiv. Naga H = 30 m
E = 12.9 [dB/μ]

LEGASPI – NAGA HEIGHT PATTERN OF FIELD STRENGTH



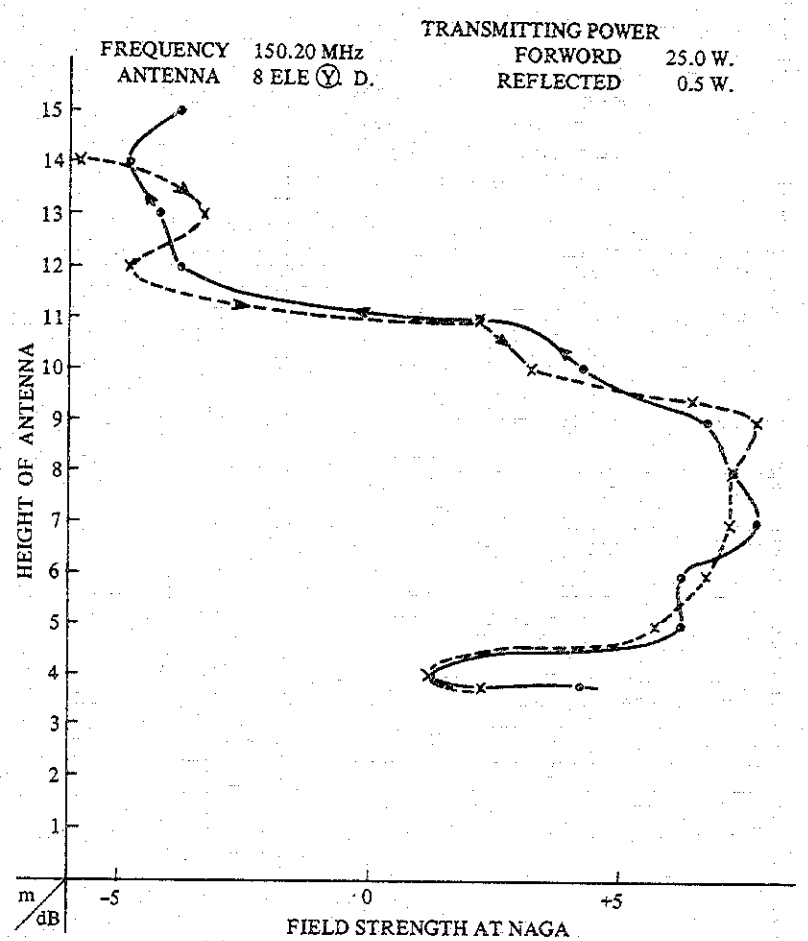
RECEIVING ANTENNA HEIGHT AT NAGA FOR LEGASPI

F.S.M.

INSTRUMENT ML 518A (ANRITSU)

MEASURED DATE D 17 M NOV. Y 1981 MEASURER FUJII, SUZUKI

LEGASPI – NAGA HEIGHT PATTERN OF FIELD STRENGTH



TRANSMITTING ANTENNA HEIGHT AT LEGASPI FOR NAGA

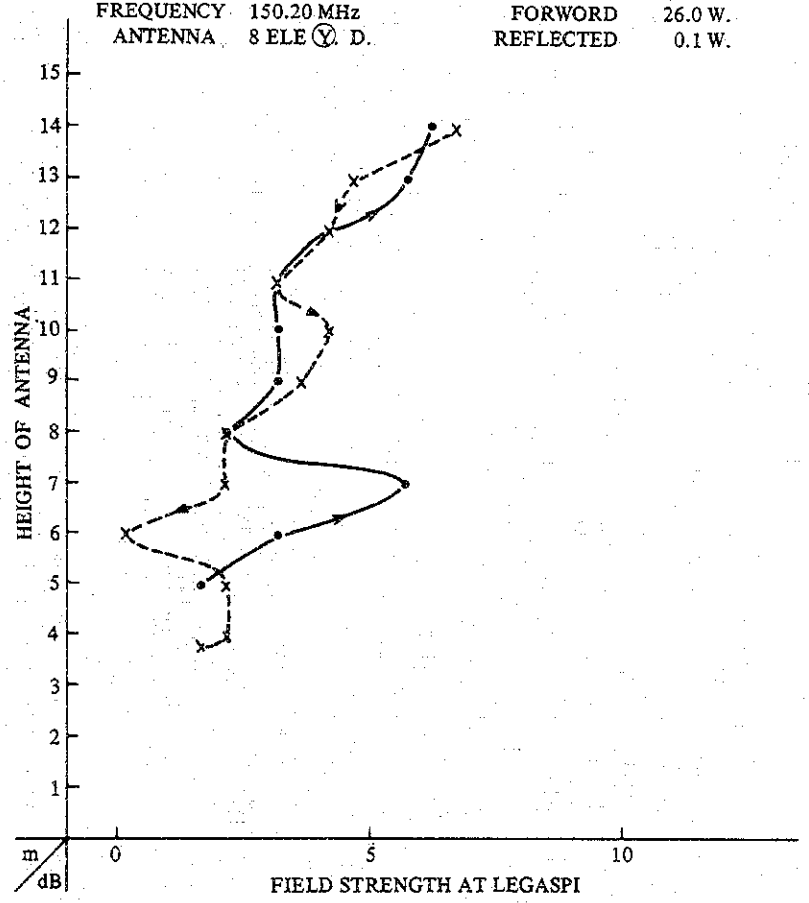
F.S.M.

INSTRUMENT ML 518A (ANRITSU)

MEASURED DATE D 17 M NOV. Y 1981 MEASURER FUJII, SUZUKI

LEGASPI – NAGA HEIGHT PATTERN OF FIELD STRENGTH

TRANSMITTING POWER
FREQUENCY 150.20 MHz FORWORD 26.0 W.
ANTENNA 8 ELE Ⓨ D. REFLECTED 0.1 W.



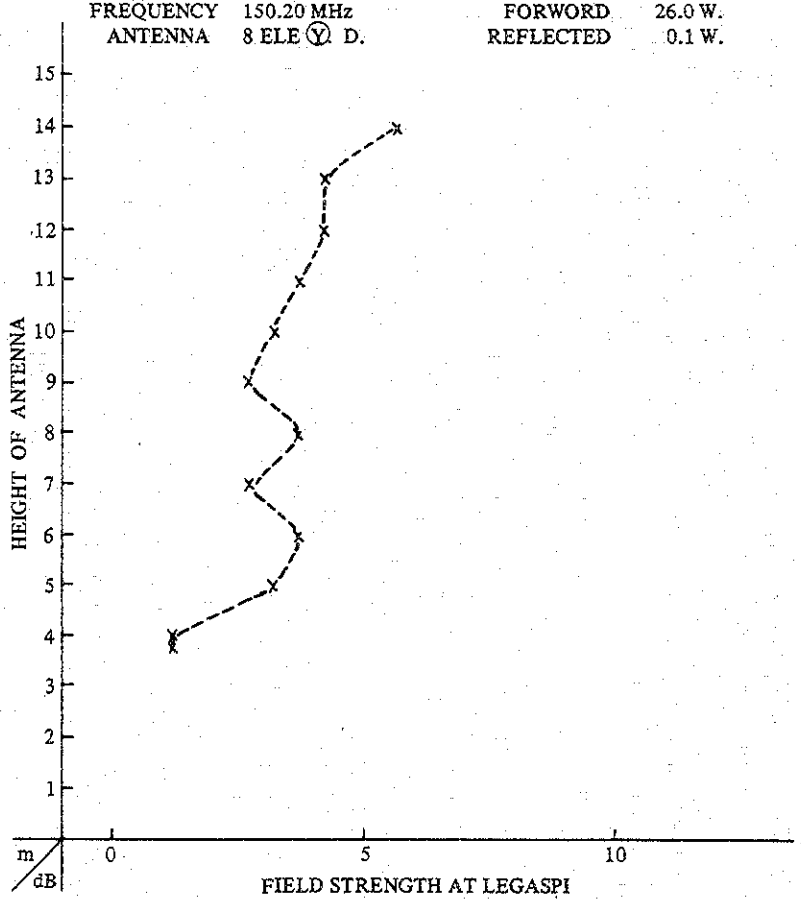
TRANSMITTING ANTENNA HEIGHT
AT NAGA FOR LEGASPI

F.S.M.
INSTRUMENT ML 518A (ANRITSU)

MEASURED DATE D 17 M NOV. Y 1981 MEASURER FUKUI, IGARASHI

LEGASPI – NAGA HEIGHT PATTERN OF FIELD STRENGTH

TRANSMITTING POWER
FREQUENCY 150.20 MHz FORWORD 26.0 W.
ANTENNA 8 ELE Ⓨ D. REFLECTED 0.1 W.

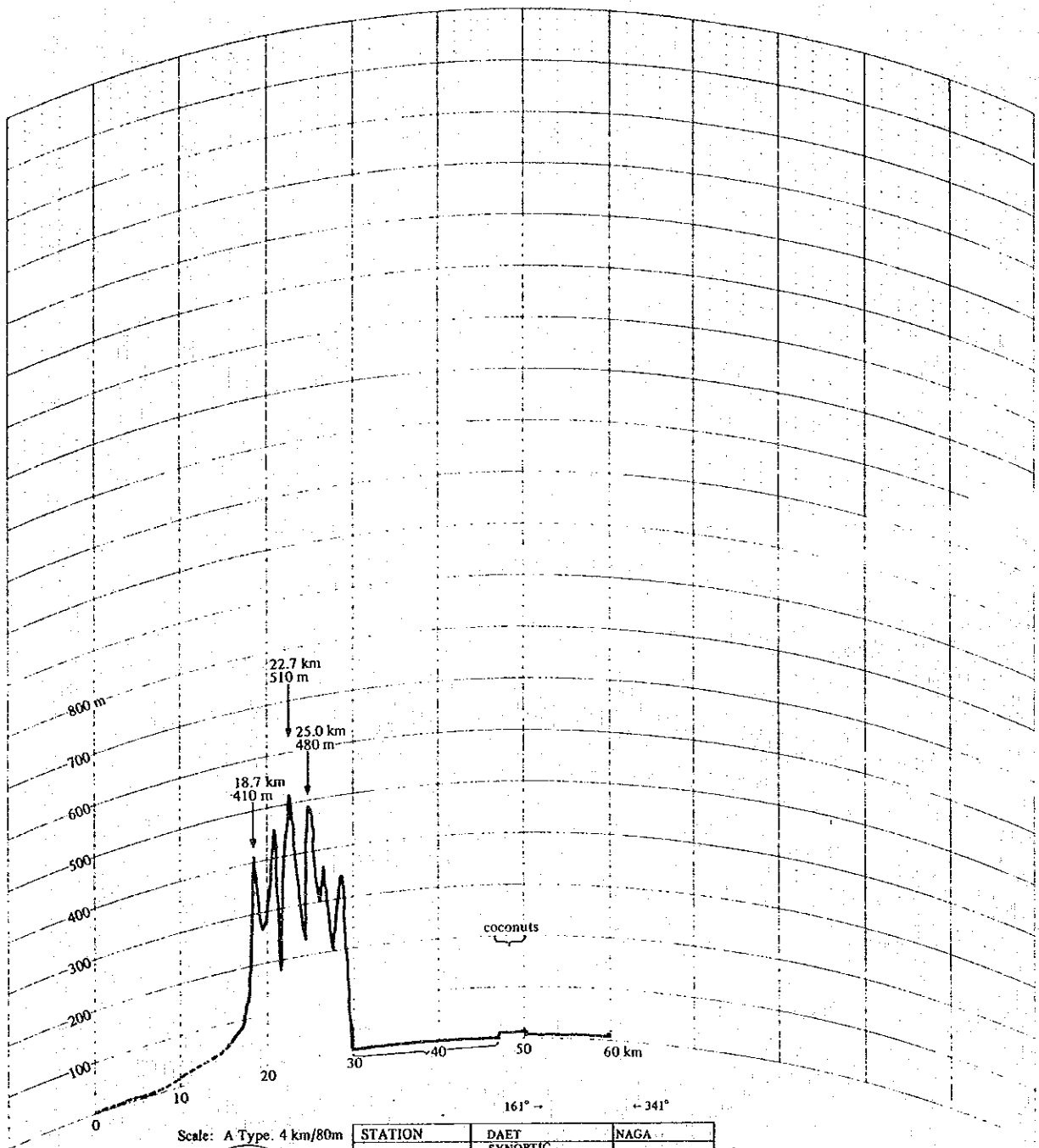


TRANSMITTING ANTENNA HEIGHT
AT NAGA FOR LEGASPI

F.S.M.
INSTRUMENT ML 518A (ANRITSU)

MEASURED DATE D 17 M NOV. Y 1981 MEASURER FUKUI, IGARASHI

PROFILE



Scale: A Type. 4 km/80m
B Type. 2 km/20m
C Type. 1 km/ 5m

STATION	DAET		NAGA	
PLACE	SYNOPTIC RADAR STATION		SUB CENTER	
	N	14° 07' 50"	N	13° 37' 21"
	E	122° 58' 57"	E	123° 09' 56"
HEIGHT(M.S.L)	2 m		2 m	
DISTANCE	59.7 km			

161° → ← 341°

Date: 12 Nov. 1981

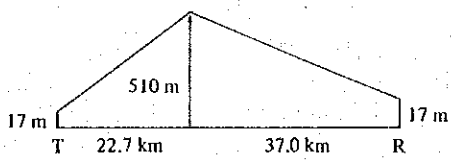
No. 4

DAET – NAGA LEVEL DIAGRAM FOR DESIGNING THE RADIO COMMUNICATION CIRCUIT (1)

Number of Profile (1/2)

No. 4

Height (MSL)	2	m	Height (MSL)	2	m
Height of Antenna	15	m	Height of Antenna	15	m
Total Height	17	m	Total Height	17	m



(DAET) ← 59.7 km → (NAGA)

Items		Estimated Level Diagram			Level Diagram of Propergation Test		
		Calculated Value	Corrected Value	Remarks	Calculated Value	Measured Value	Remarks
Feeder Loss (Tx)	db	- 2.50	- 4.6	m	- 2.5	- 4.6 *(- 2.1)	8D–2V 50 m
Antenna Gain (Tx)	db	11.00	11.0		11.0	←	
Free Space Loss	db	- 111.48	- 111.48		- 111.48	←	
Additional Loss	S1 db	- 26.2	- 26.2		- 26.2	- 26.2	
	S2 db		- 1.7			(- 1.7)	Compensatory Avlue
	S3 db						
	db						
Antenna Gain (Rx)	db	11.00	11.0		11.0	←	
Feeder Loss (Rx)	db	- 2.50	- 2.5	m	- 2.5	←	8D–2V 25 m
Loss of Others	db						
Total Loss	db	- 120.68	- 124.48		- 120.68	- 124.48	
Transmitting Power	db/w	13.98	13.98	25 w	13.98	13.98	25 w
Receiving Power	db/w	- 106.70	- 110.5		(1) -106.7 db/w	(2) -110.5 dB/W	
Threshold Level	db/w	- 144.7	- 144.7	B 12 KHz F 9.5 db	(1) 36.0 db/μ (2) 32.2 db/μ		
Threshold Margin	db	38.0	34.2		- 3.8 db/μ		
Threshold S/N	db	21.2	21.2	mo r/ch B KHz	- (-2.1) * / - 1.7		
Standard S/N	db	59.2	55.4				
Estimated Fading Loss	db	- 6.0	- 6.0	0.1 dB/km			
Frequency				150.20 MHz	S/N = 54 [dB]		

Measured Value of Field Strength	Antenna Height of Receiver	Antenna Height of Transmitter
32.2[dB/ω]	15 m	35
32.2	14	
31.7	13	
29.7	12	
29.7	11	
29.2	10	
28.7	9	
28.7	8	
27.7	7	

(Received at DAET)

Remarks:

Measured Date: D 20 M Nov. Y 1981

150.20 MHz

Instrument: Field Strength Meter ML–518A

Transmitter: FM Transceiver JHV–225

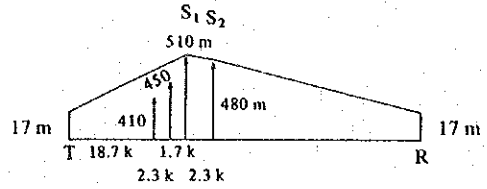
Noted Date: D 12 M Nov. y Y 1981 Station:

DAET – NAGA LEVEL DIAGRAM FOR DESIGNING THE RADIO COMMUNICATION CIRCUIT (2)

Number of Profile (2/2)

No. 4

Height (MSL)	2	m			Height (MSL)	2	m
Height of Antenna	15	m			Height of Antenna	15	m
Total Height	17	m			Total Height	17	m



(DAET) ← 59.7 km → (NAGA)

Items		Estimated Level Diagram			Level Diagram of Propergation Test		
		Calculated Value	Corrected Value	Remarks	Calculated Value	Measured Value	Remarks
Feeder Loss (Tx)	db	- 2.50	- 4.6	m	- 2.5	- 4.6 *(- 2.1)	8D–2V 50 m
Antenna Gain (Tx)	db	11.00	11.0		11.0	←	
Free Space Loss	db	- 111.48	- 111.48		- 111.48	←	
Additional Loss	S1 db	- 17.0			- 17.0		
	S2 db	- 8.0	- 34.0		- 8.0	- 34.0	
	S3 db				- 9.0		
	db	- 9.0	6.1			(+ 6.1)	Compensatory Value
Antenna Gain (Rx)	db	11.0	11.0		11.0	←	
Feeder Loss (Rx)	db	- 2.50	- 2.5	m	- 2.5	←	8D–2V 25 m
Loss of Others	db						
Total Loss	db	- 128.48	- 124.48		- 128.48	- 124.48	
Transmitting Power	db/w	13.98	13.98	25 w	13.98	13.98	25 w
Receiving Power	db/w	- 114.50	- 110.5		(1) -114.5 db/w	(2) -110.5 dB/W	
Threshold Level	db/w	- 144.7	- 144.7	B 12 KHz F 9.5 db	(1) 28.2 db/μ -)(2) 32.2 db/μ	Measured Value of Field Strength	Antenna Height of Receiver / Transmitter
Threshold Margin	db	30.20	34.2		+ 4.0 db/μ		
Threshold S/N	db	21.2	21.2	mo r/ch B KHz	-(-2.1) * + 6.1	32.2 [dB/ω]	15 m / 35
Standard S/N	db	51.4	55.4		S/N = 54 [dB]	32.2	14
Estimated Fading Loss	db	- 6.0	- 6.0	0.1 dB/km		31.7	13
Frequency				150.20 MHz		29.7	12
						29.7	11
						29.2	10
						28.7	9
						28.7	8
						27.7	7

(Received at DAET)

Remarks:

Measured Date: D 20 M Nov. Y 1981
150.20 MHz
Instrument: Field Strength Meter ML–518A
Transmitter: FM Transceiver JHV–225

Noted Date: D 12 M Nov. Y 1981 Station:

NAGA—DAET MEASURED FIELD STRENGTH OF VHF RADIO WAVE (1)

Week Day Month Year

Date: (Fri.) 20 Nov. 1981 (Fair)

Measured by Fukui, Igarashi, Fontano, Morales, Maraña, Santos

Frequency 150.20 MHz, MHz

Measured at N 13°37'21" E123°09'56" NAGA Height (MSL) 2 m

Transmitted at N 14°07'50" E122°58'57" DAET Height (MSL) 2 m

Instrument Field Strength Meter Model: ML 518A (Anritsu)

Transmitter FM Transceiver 150 MHz 25W Model: JHV-225 (JRC)

SKETCH OF MEASURING PLACE IN ——

See the Appendix IV.

Time	Transmitting Station	Measured Field Strength Value (db)	Receiving Antenna						Transmitting Antenna						Output Power	
			Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Forward Power (W)	Reflected Power (W)
09:00	DAET	12.7	H	8 ELE YAGI	3.8	341	FFWS Sub-Center	25 (8D–2V) 1 (5D–2V)	H	8 ELE YAGI	3.8	160	Daet Weather Station	25 (8D–2V) 1 (5D–2V)	25.0	0.4
		12.7			4.0											
		11.2			5.0											
		14.4			6.0											
		17.7			7.0											
		20.2			8.0											
		20.7			9.0											
		23.2			10.0											
		25.2			11.0											
		26.2			12.0											
		28.2			13.0											
		29.0			14.0											
09:10		* 30.7			15.0											

Remarks

Receiving Antenna Height at Naga for Daet (up)

* Max. 30.7 db 15.0 m

NAGA—DAET MEASURED FIELD STRENGTH OF VHF RADIO WAVE (2)

SKETCH OF MEASURING PLACE IN —

Measured by Fukui, and 5 the others

Date: Week (Fri.) Day 20 Month Nov. Year 1981 (Fair)

Frequency 150.20 MHz, MHz

Measured at NAGA Height (MSL) 2 m

Transmitted at DAET Height (MSL) 2 m

Instrument ML 518A

Transmitter JHV–225

Time	Transmitting Station	Measured Field Strength Value (db)	Receiving Antenna						Transmitting Antenna						Output Power	
			Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Forward Power (W)	Reflected Power (W)
09:10	DAET	* 30.7	H	8 ELE YAGI	15.0	341	FFWS Sub-Center	25 (8D–2V) 1 (5D–2V)	H	8 ELE YAGI	3.8	160	Daet Weather Station	25 (8D–2V) 1 (5D–2V)	25.0	0.4
		28.9			14.0											
		27.5			13.0											
		26.2			12.0											
		25.2			11.0											
		23.4			10.0											
		21.2			9.0											
		19.4			8.0											
		17.7			7.0											
		13.9			6.0											
		10.7			5.0											
		12.0			4.0											
09:20		12.2			3.8											

Remarks

Receiving Antenna Height at Naga for Daet (down)

* Max. 30.7 db, 15.0 m

NAGA—DAET MEASURED FIELD STRENGTH OF VHF RADIO WAVE (3)

Measured by Fujii, Suzuki, Bito-On, Garcia, Prenda, and Cruz

Date: Week (Fri.) Day 20 Month Nov. Year 1981 (Fair)

Frequency 150.20 MHz, MHz

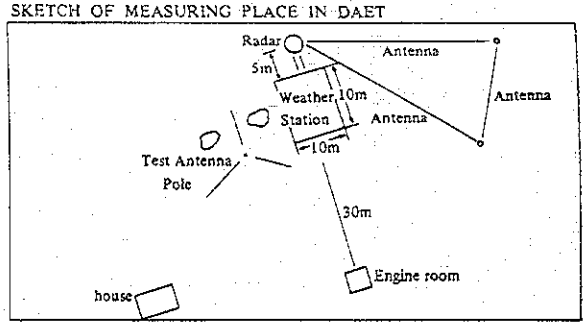
Measured at DAET Height (MSL) 2 m

Transmitted at NAGA Height (MSL) 2 m

Instrument Field Strength Meter Model: ML 518A (Anritsu)

Transmitter FM Transceiver, 150MHz 25W Model: JHV–225 (JRC)

SKETCH OF MEASURING PLACE IN DAET



Time	Transmitting Station	Measured Field Strength Value (db)	Receiving Antenna						Transmitting Antenna						Output Power	
			Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Forward Power (W)	Reflected Power (W)
09:30	NAGA	8.7	H	8 ELE YAGI	3.8	160	Daet Weather	25 (8D–2V) 1 (5D–2V)	H	8 ELE YAGI	3.8	355	FFWS Sub-Center	25 (8D–2V) 1 (5D–2V)	26 0	0 2
		8.7			4.0		Station									
		10.2			5.0											
		10.7			6.0											
		10.2			7.0											
		10.2			8.0											
		11.2			9.0											
		11.7			10.0											
		11.7			11.0											
		12.2			12.0											
		13.7			13.0											
		* 14.2			14.0											
09:45		13.7			15.0											

Remarks

Receiving Antenna Height at Daet for Naga (up)

* Max. 14.2 db, 14.0 m

NAGA—DAET MEASURED FIELD STRENGTH OF VHF RADIO WAVE (4)

SKETCH OF MEASURING PLACE IN ——

Week Day Month Year
Date: (Fri.) 20 Nov. 1981 (Fair)

Measured by Fujii, and 5 the others

Frequency 150.20 MHz, MHz

Measured at DAET Height (MSL) 2 m

Transmitted at NAGA Height (MSL) 2 m

Instrument ML 518A

Transmitter JHV-225

Time	Transmitting Station	Measured Field Strength Value (db)	Receiving Antenna						Transmitting Antenna						Output Power	
			Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Forward Power (W)	Reflected Power (W)
09:45	NAGA	* 14.2	H	8 ELE YAGI	14.0	160	Daet Weather Station	25 (8D–2V) 1 (5D–2V)	H	8 ELE YAGI	3.8	355	FFWS Sub-Center	25 (8D–2V) 1 (5D–2V)	26.0	0.2
		13.7			13.0											
		12.2			12.0											
		11.2			11.0											
		11.2			10.0											
		10.7			9.0											
		10.2			8.0											
		10.2			7.0											
		10.2			6.0											
		10.2			5.0											
		8.7			4.0											
10:00		7.2			3.8											

Remarks

Receiving Antenna Height at Daet for Naga (down)

* Max. 14.2 db, 14.0 m

NAGA--DAET MEASURED FIELD STRENGTH OF VHF RADIO WAVE (5)

SKETCH OF MEASURING PLACE IN ——

Measured by Fujii, and 5 the others

Date: Week (Fri.) Day 20 Month Nov. Year 1981 (Fair)

Frequency 150.20 MHz, MHz

Measured at DAET Height (MSL) 2 m

Transmitted at NAGA Height (MSL) 2 m

Instrument ML 518A

Transmitter JHV-225

Time	Transmitting Station	Measured Field Strength Value (db)	Receiving Antenna						Transmitting Antenna						Output Power	
			Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Forward Power (W)	Reflected Power (W)
10:40	NAGA	15.2	H	8 ELE YAGI	14.0	160	Daet Weather	25 (8D-2V) 1 (5D-2V)	H	8 ELE YAGI	3.8	355	FFWS Sub-Center	25 (8D-2V) 1 (5D-2V)	23.0	0.4
		14.7			Best Receiv. Height		Station				4.0					
		13.7									5.0					
		15.7									6.0					
		22.7									7.0					
		22.2									8.0					
		23.7									9.0					
		25.4									10.0					
		27.2									11.0					
		28.7									12.0					
		30.2									13.0					
		* 31.2									14.0					
10:45		* 31.2									15.0					

Remarks

Transmitting Antenna Height at Naga for Daet (up)

* Max. 31.2 db, 14.0 m, 15.0 m

NAGA—DAET MEASURED FIELD STRENGTH OF VHF RADIO WAVE (6)

Measured by Fujii, and 5 the others

Week Day Month Year
Date: (Fri.) 20 Nov. 1981 (Cloudy)

Frequency 150.20 MHz, MHz

Measured at DAET Height (MSL) 2 m

Transmitted at NAGA Height (MSL) 2 m

Instrument ML 518A

Transmitter JHV--225

SKETCH OF MEASURING PLACE IN ——

Time	Transmitting Station	Measured Field Strength Value (db)	Receiving Antenna						Transmitting Antenna						Output Power	
			Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Forward Power (W)	Reflected Power (W)
10:45	NAGA	* 30.7	H	8 ELE YAGI	14.0	160	Daet Weather	25 (8D--2V) 1 (5D--2V)	H	8 ELE YAGI	15.0	355	FFWS Sub-Center	25 (8D--2V) 1 (5D--2V)	23.0	0.4
		29.2					Station				14.0					
		28.2									13.0					
		27.2									12.0					
		24.7									11.0					
		22.7									10.0					
		21.7									9.0					
		19.2									8.0					
		16.2									7.0					
		13.7									6.0					
		14.7									5.0					
		14.7									4.0					
10:55		14.7									3.8					

Remarks

Transmitting Antenna Height at Naga for Daet (down)

* Max. 30.7 db, 15.0 m

NAGA—DAET MEASURED FIELD STRENGTH OF VHF RADIO WAVE (7)

SKETCH OF MEASURING PLACE IN ——

Measured by Fujii, and 5 the others

Date: Week (Fri.) Day 20 Month Nov. Year 1981 (Fair)

Frequency 150.20 MHz, MHz

Measured at DAET Height (MSL) 2 m

Transmitted at NAGA Height (MSL) 2 m

Instrument ML 518A

Transmitter JHV–225

Time	Transmitting Station	Measured Field Strength Value (db)	Receiving Antenna						Transmitting Antenna						Output Power	
			Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Forward Power (W)	Reflected Power (W)
11:25	NAGA	25.7	H	8 ELE YAGI	3.8	160	Daet Weather Station	25 (8D–2V) 1 (5D–2V)	H	8 ELE YAGI	35	355	Tower of Parabolic Antenna	25 (8D–2V) 1 (5D–2V)	23.0	0.4
		26.7			4.0											
		28.4			5.0											
		28.7			6.0											
		29.0			7.0											
		29.0			8.0											
		29.7			9.0											
		29.7			10.0											
		29.7			11.0											
		30.7			12.0											
		31.7			13.0											
		* 32.2			14.0											
11:30		* 32.2			15.0											

Remarks

Receiving Antenna Height at Daet (up)
(Transmitting Antenna Height at Naga = 35 [m])

* 32.2 db, 14.0 m
15.0 m

NAGA—DAET MEASURED FIELD STRENGTH OF VHF RADIO WAVE (8)

SKETCH OF MEASURING PLACE IN ——

Week Day Month Year
Date: (Fri.) 20 Nov. 1981 (Fair)

Measured by Fujii, and 5 the others

Frequency 150.20 MHz, MHz

Measured at DAET Height (MSL) 2 m

Transmitted at NAGA Height (MSL) 2 m

Instrument ML 518A

Transmitter JHV–225

Time	Transmitting Station	Measured Field Strength Value (db)	Receiving Antenna						Transmitting Antenna						Output Power	
			Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Forward Power (W)	Reflected Power (W)
11:30	NAGA	* 32.2	H	8 ELE YAGI	14.0	160	Daet Weather Station	25 (8D–2V) 1 (5D–2V)	H	8 ELE YAGI	35	355	Tower of Parabolic Antenna	25 (8D–2V) 1 (5D–2V)	23.0	0.4
		31.7			13.0											
		29.7			12.0											
		29.7			11.0											
		29.2			10.0											
		28.7			9.0											
		28.7			8.0											
		27.7			7.0											
		27.4			6.0											
		24.4			5.0											
		26.7			4.0											
11:45		25.7			3.8											

Remarks

Receiving Antenna Height at Daet (down)
(Transmitting Antenna Height at Naga = 35 [m])

* Max. 32.2 db, 14.0 m

N = – 14 db
C = – 59 db S/N = 54 db
S = – 5

NAGA—DAET MEASURED FIELD STRENGTH OF VHF RADIO WAVE (9)

SKETCH OF MEASURING PLACE IN ——

Measured by Fukui, and 5 the others

Week Day Month Year

Date: (Fri.) 20 Nov. 1981 (Fair)

Frequency 150.20 MHz, MHz

Measured at NAGA Height (MSL) 2 m

Transmitted at DAET Height (MSL) 2 m

Instrument ML 518 A

Transmitter JHV–225

Time	Transmitting Station	Measured Field Strength Value (db)	Receiving Antenna						Transmitting Antenna						Output Power	
			Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Forward Power (W)	Reflected Power (W)
12:30	DAET	23.2	H	8 ELE YAGI	3.8	355	FFWS Sub-Center	25 (8D–2V) 1 (5D–2V)	H	8 ELE YAGI	14.0	160	Daet Weather	25 (8D–2V) 1 (5D–2V)	23.0	0.4
		24.0			4.0						(Best Receiv. Height)		Station			
		25.7			5.0											
		26.0			6.0											
		26.5			7.0											
		26.4			8.0											
		27.0			9.0											
		27.5			10.0											
		27.2			11.0											
		28.2			12.0											
		29.2			13.0											
		* 29.7			14.0											
12:37		29.4			15.0											

Remarks

Receiving Antenna Height at Naga for Daet (up)

* Max. 29.7 db, 14.0 m

NAGA—DAET MEASURED FIELD STRENGTH OF VHF RADIO WAVE (10)

SKETCH OF MEASURING PLACE IN ——

Week Day Month Year
Date: (Fri.) 20 Nov. 1981 (Fair)

Measured by Fukui, and 5 the others

Frequency 150.20 MHz, MHz

Measured at NAGA Height (MSL) 2 m

Transmitted at DAET Height (MSL) 2 m

Instrument ML 518A

Transmitter JHV--225

Time	Transmitting Station	Measured Field Strength Value (db)	Receiving Antenna						Transmitting Antenna						Output Power	
			Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Polarization	Type	Height Above the Ground (m)	Direction (deg.)	Location	Length of Coaxial Feeder (m)	Forward Power (W)	Reflected Power (W)
12:37	DAET	29.4	H	8 ELE YAGI	15.0	355	FFWS Sub-Center	25 (8D--2V) 1 (5D--2V)	H	8 ELE YAGI	14.0	160	Daet Weather	25 (8D--2V) 1 (5D--2V)	23 0	0 4
		* 30.0			14.0						(Best Receiv. Height)		Station			
		29.2			13.0											
		28.2			12.0											
		27.2			11.0											
		27.5			10.0											
		27.4			9.0											
		26.2			8.0											
		26.6			7.0											
		25.7			6.0											
		25.4			5.0											
		24.2			4.0											
12:45		23.8			3.8											

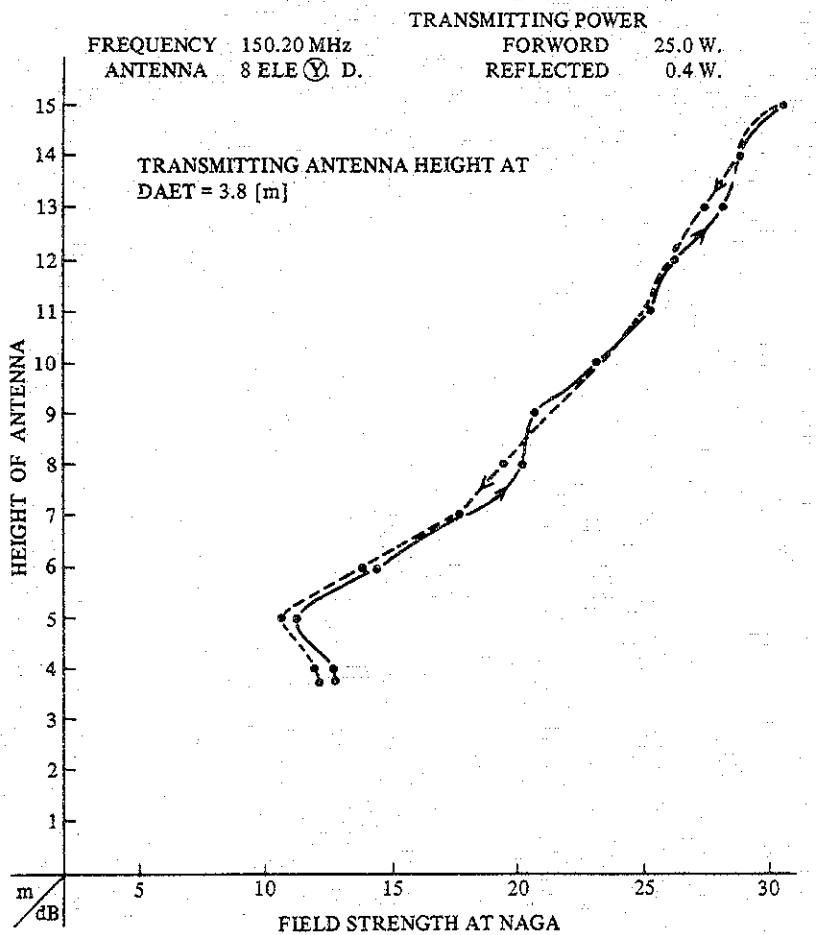
Remarks

Receiving Antenna Height at Naga for Daet (down)

* Max. 30.0 db, 14 0 m

C = - 57 db
S = - 5 db
N = - 15 db
S/N = 52 db

NAGA – DAET HEIGHT PATTERN OF FIELD STRENGTH

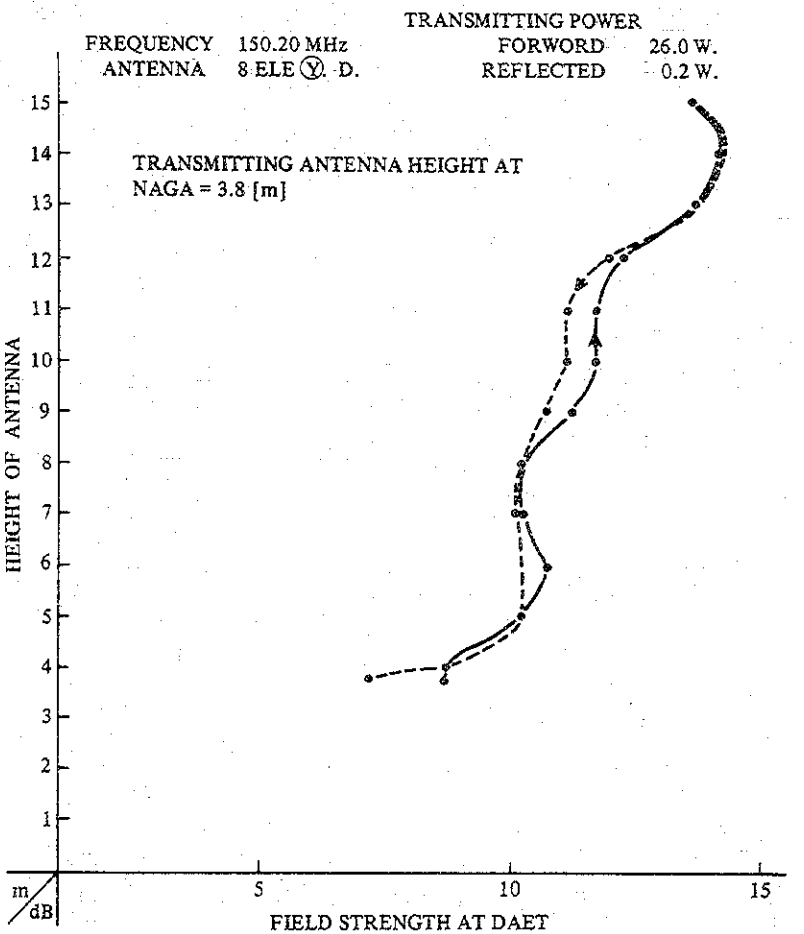


RECEIVING ANTENNA HEIGHT AT
NAGA FOR DAET

F.S.M.
INSTRUMENT ML 518A (ANRITSU)

MEASURED DATE D 20 M NOV. Y 1981 MEASURER FUKUI, IGARASHI

NAGA – DAET HEIGHT PATTERN OF FIELD STRENGTH



RECEIVING ANTENNA HEIGHT AT
DAET FOR NAGA

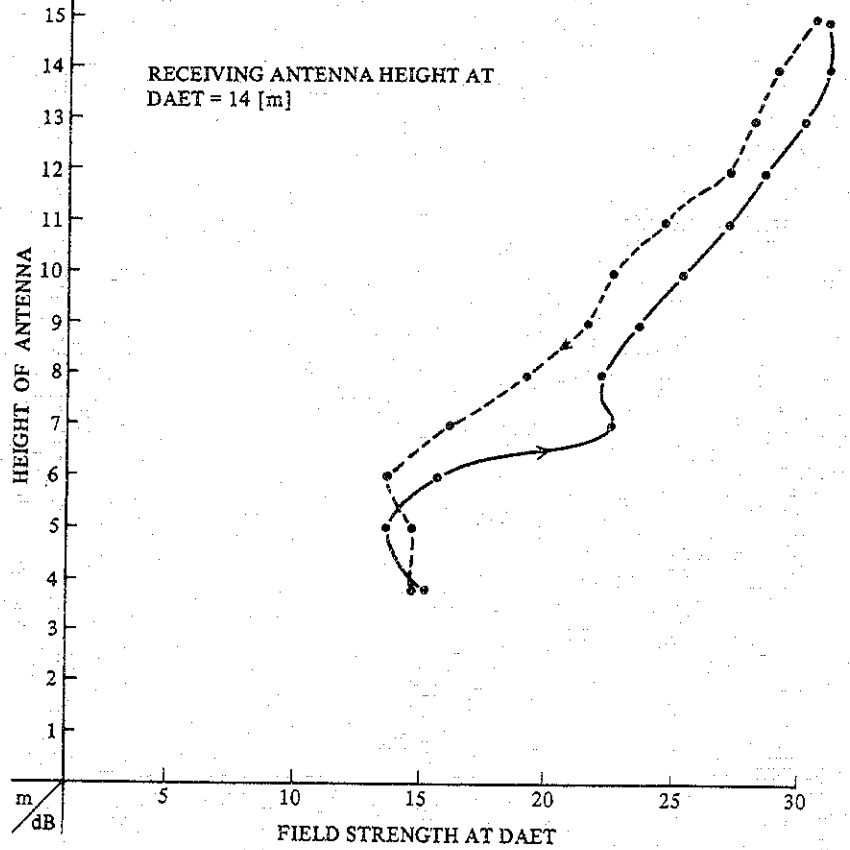
F.S.M.
INSTRUMENT ML 518A (ANRITSU)

MEASURED DATE D 20 M NOV. Y 1981 MEASURER FUJII, SUZUKI

NAGA – DAET HEIGHT PATTERN OF FIELD STRENGTH

TRANSMITTING POWER
FREQUENCY 150.20 MHz FORWORD 23.0 W.
ANTENNA 8 ELE Ⓨ D. REFLECTED 0.4 W.

RECEIVING ANTENNA HEIGHT AT
DAET = 14 [m]



TRANSMITTING ANTENNA HEIGHT AT
NAGA FOR DAET

F.S.M.

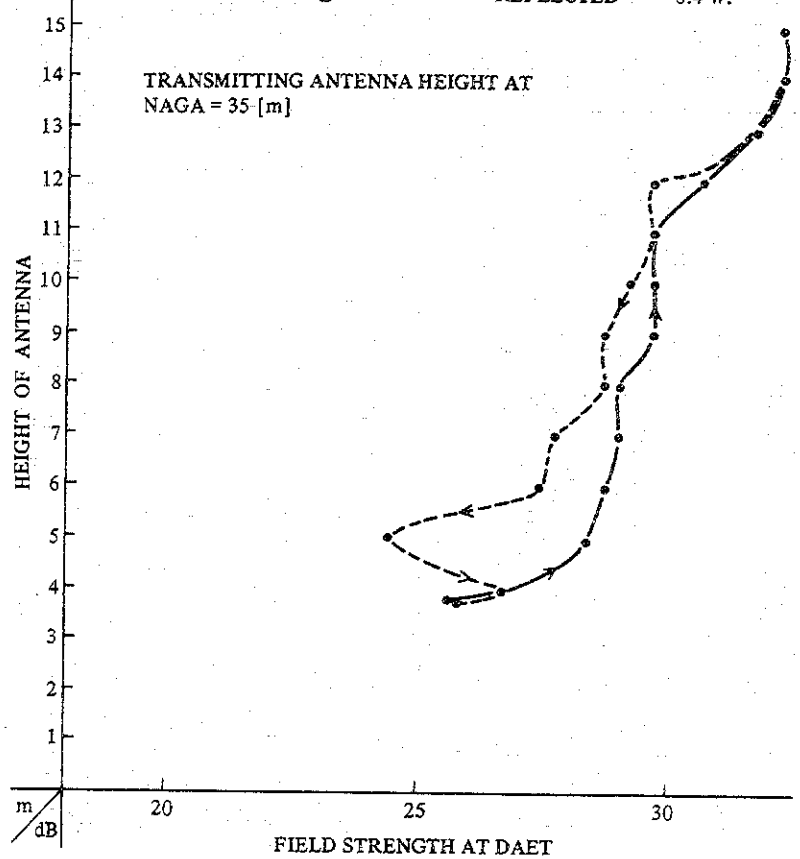
INSTRUMENT ML 518A (ANRITSU)

MEASURED DATE D 20 M NOV. Y 1981 MEASURER FUJII, SUZUKI

NAGA – DAET HEIGHT PATTERN OF FIELD STRENGTH

TRANSMITTING POWER
FREQUENCY 150.20 MHz FORWORD 23.0 W.
ANTENNA 8 ELE Ⓨ D. REFLECTED 0.4 W.

TRANSMITTING ANTENNA HEIGHT AT
NAGA = 35 [m]



RECEIVING ANTENNA HEIGHT AT
DAET FOR NAGA

F.M.S.

INSTRUMENT ML 518A (ANRITSU)

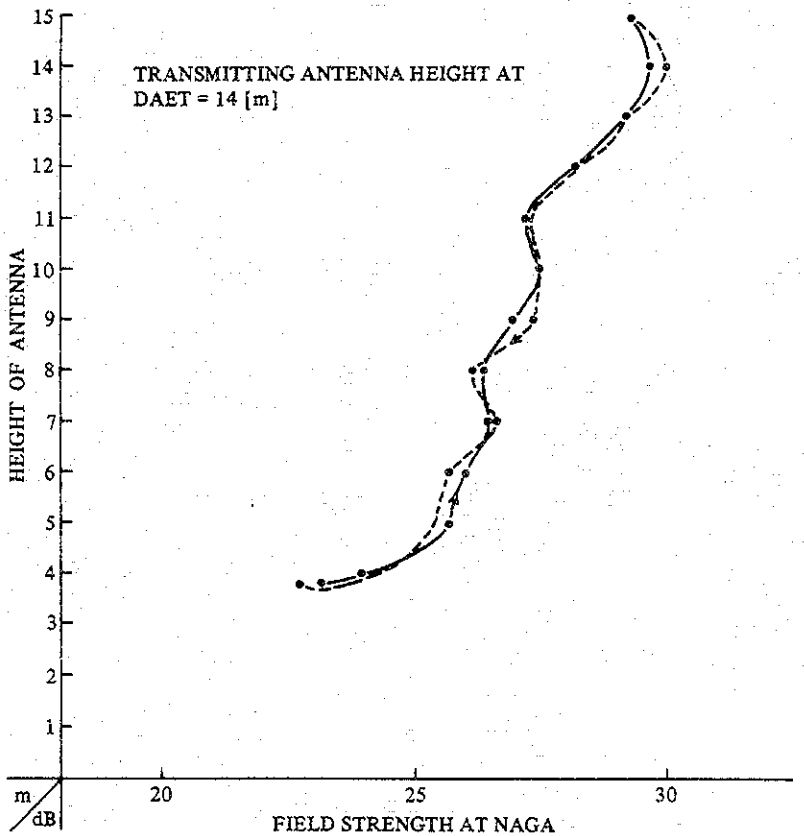
MEASURED DATE D M Y MEASURER FUJII, SUZUKI

NAGA – DAET HEIGHT PATTERN OF FIELD STRENGTH

TRANSMITTING POWER

FREQUENCY 150.20 MHz
ANTENNA 8 ELE Ⓨ D.

FORWORD 23.0 W.
REFLECTED 0.4 W.



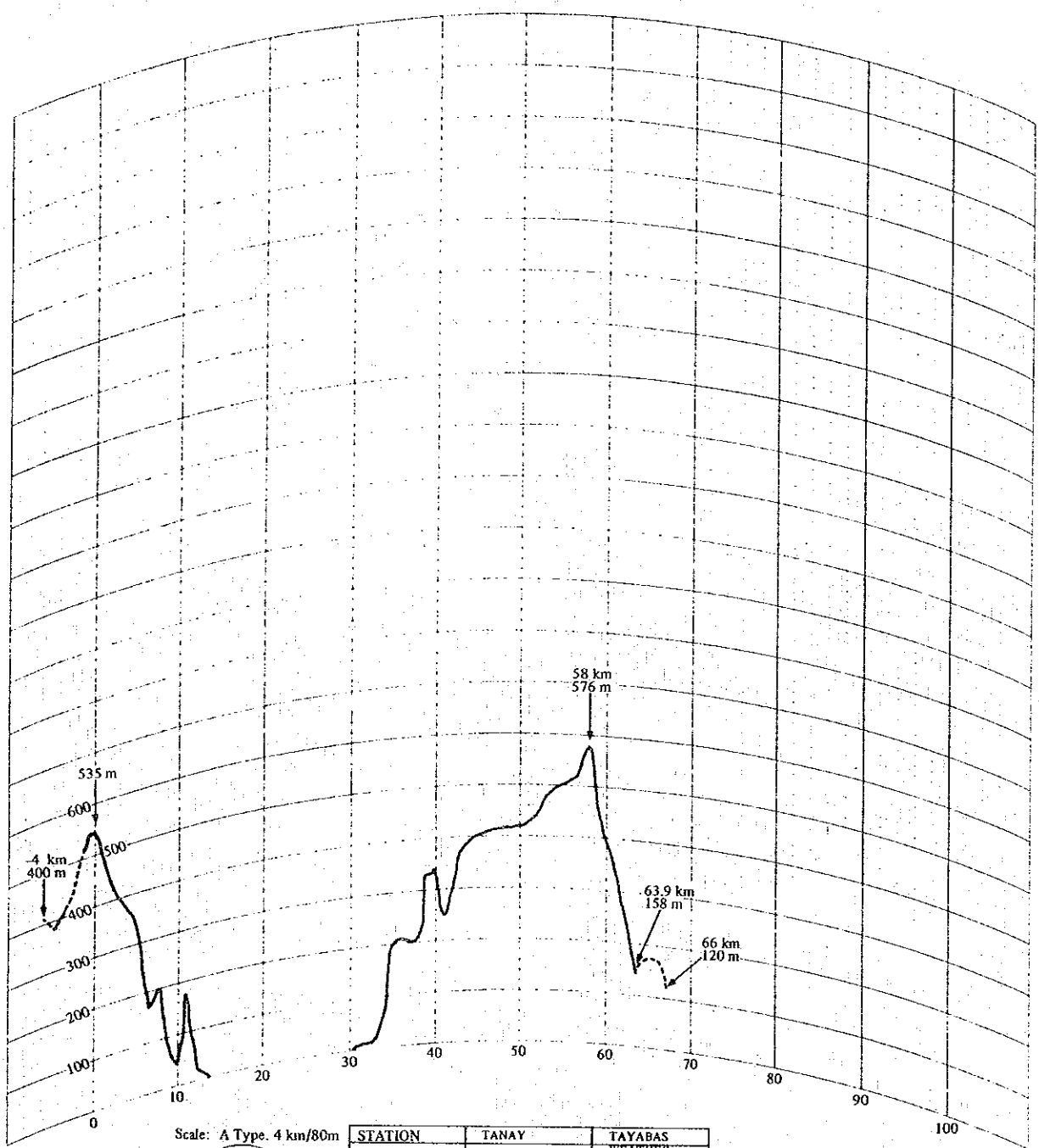
RECEIVING ANTENNA HEIGHT AT
NAGA FOR DAET

F.S.M.

INSTRUMENT ML 518A (ANRITSU)

MEASURED DATE D 20 M NOV. Y 1981 MEASURER FUKUI, IGARASHI

PROFILE



Scale: A Type. 4 km/80m
B Type. 2 km/20m
C Type. 1 km/ 5m

STATION	TANAY		TAYABAS
PLACE	REPEATER		WEATHER STATION
	N	14° 33' 53"	N 14° 02'
	E	121° 21' 07"	E 121° 35'
HEIGHT(M.S.L)	530 m		157 m
DISTANCE	63.9 km		

Date: 12 Nov. 1981

No. 5