Number of Profil	e	Height (MS Height of A		i30 m 15 m	· · ·	Height (MS Height of A	ntenna	57 m 15 m
()	Total He	ight S	i45 m -		Total H	eight 1	72 m
				-				
						A		
No. 5	÷					$\left \right\rangle$		
				· ·	576 m	$ \rangle$		
	1							
				Т	58 km	5.9 km R		
		(TANA	Y)	63.9 km	• (T	AYABAS)
		Esti	mated Level I	Diagram	Level	Diagram of Pr	opergation T	est
Items		Calculated Value	Corrected Value	Remarks	Calculated Value	Measured Value		Remarks
Feeder Loss (Tx)	db	- 2,5	- 2,5	m	- 2.5			2V 25 m
Antenna Gain (Tx)	db	11.0	11.0	· .	11.0	÷		
Free Space Loss	db	- 112.1	- 112.1	·	- 112.1	~		
Additional Loss	S1 db S2 db	- 27.0	- 27.0		- 27.0	- 27.0		
4 L	\$3 db				4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			
	db		- 2.4			(- 2.4)	Compe	nsatory Value
Antenna Gain (Rx)	db	11.0	11.0		11.0	+		
Feeder Loss (Rx)	db db	- 2.5	- 2.5	m	- 2.5	+	8D2	2V 25 m
Loss of Others Total Loss	db	- 122.1	- 124.5		- 122.1		<u> </u>	
Transmitting Power	db/w	13.98	13.98	W	13.98	13.98		25 w
Receiving Power	db/w	- 108.12	- 110.52		(1) -108.1 db/w	(2) -110.5 dB		:
Threshold Level			·	B 12 KHz	(1) 34.6 db/μ	Measured Value of		itenna ight of
I mesnolu i zvel	db/w	- 144.7	- 144.7		-)(2) 32.2 db/µ	Field		igni or
Threshold Margin	db	36.58	34.18		- 2.4 db/µ	Strength	Receiver	Transmitter
Threshold S/N	db	21.2	21.2	mo r/cł			12.0	
Standard S/N	db	57,78	55,38	B KHiz		25.7 dB/µ 29.2	13.0 m 12.0	15.0 m
Estimated Fading Loss		6.4	6.4			30.7	12.0	
Frequency	11	s Be		150.20 MHz	S/N = 59 [dB]			
· · · · · · · · · · · · · · · · · · ·	-	 Sector		- 		29.2	7.0	
Remarks:		: *		•		30.7 32.2	6.0 5.0	
					1	31.2	4.0	
			· ·		1	30.7	3.8	
an a				ан ал	· .	(Received a	t TANAY)	
			· .				· · · ·	· •
.:	- 19 L -							- 1 - 1
	•				Measured Date:	D 22 M 1		
· .				· · ·	Instant P	ald Chenneth bf		50.20 MHz
	·				Instrument: Fi Transmitter: Fi	eld Strength M I Transceiver	HV-225	04
			•					
				· ·				
Noted Date: D I	- - 14		1981	Static	<u></u>			

	/ _ / wzter 0) 		House	:	Output Power	Forward Reflected Power Power (W) (W)	25.0 0.22	 						- :	st Tanav (un)			·		
E IN TANAY		moo	(III				Length of F. Coarial F. (m)									Receivino Antenna Heicht at Tavahas far Tanav	V coope f # 1 to 1119	15.0 m			
SKETCH OF MEASURING PLACE IN TANAY		Envire room	Tower (H=20m)	Repeater St.			Location	FFWS Repeater	Station							no Antenna Hai		31.4 db,			
I OF MEAS	z			Test Antenna Pole		Transmitting Antenna	Direction (deg.)	170	· .						Remarks	Receiv.		+ Max.			:
SKETCH						Transmi	Heighr Above the Ground (m)	3.8					-								
		MHz	530 m	1			Type	8 ELE YACI										· · · ·			
	io, Maraña		Height (MSL)	, 25W			Polari zation	н				· · ·				· · · · · · · · · · · · · · · · · · ·					
	Fukui, Igarashi, Fontano, Maraña, Marales, and Santos	ม้		rer 150 MHz 1-225 (JRG			Length of Coaxial Feeder (m)	<u>25 (8D–2V)</u> 1 (5D–2V)													
VE (1)	Fukui, Igarashi, Fon Marales, and Santos	150.20 MHz,	N 14"33"53" E121°21'07" TANAY	FM Transceiver 150 MHz, 25W Model: JHV-225 (JRC)			Location	Tayabas Weather	Station												
OF VHF RADIO WAVE	Measured by	Frequency	Transmitted at	Transmitter	н. В. А	Receiving Antenna	Direction (deg.)	345													
TH OF VHF	X		H E	Ч		Receivir	Height Above the Ground (m)	3.8	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0	
TAYABAS TANAY MEASURED FIELD STRENGTH		(Rainy, Cloudy)	MSL) 157	(ns	:• • •		Type	8 ELE YAGI						-						<u> </u>	
RED FIE		n Year 1981	Height (MSL)	feter 8A (Anrit:			Polari- zation	H				:		•····							
Y MEASL		y Month Nov.	4°02' AS	Field Strength Meter Model: ML 518A (Anritsu)		Measured	Field Strength Value (db)	15.7	16.0	17.7	20.2	22.7	24.9	27.0	27.7	28.9	29.4	30.2	31.2	* 31.4	
IAS TANA		week Day (Sun.) 22	N 14'02' E121°35' dat TAYABAS				Transmitting Station	TANAY			: 										:
TAYAB	·	Date:	Measured at	Instrument			Time	08:30												08:40	
	• . •			- :	* * * _*		1	t ti	tsu a 	p. III			 			•	· .			1.114	

Date Teal of Appendix IV. Material Teal of Appendix IV. Material of Appendix IV. Materials Teal of Appendix Teal of Appendix IV. Teal of Appendix IV. Material of AV. Teal of Appendix IV. Teal of Appendix IV. Materials Teal of Appendix IV. Teal of Appendix IV. Material of Appendix IV. Teal of Appendix IV. Teal of Appendix IV. Teal of Appendix IV. Teal of Appendix IV. Teal of Appendix IV. Material of Appendix IV. Material of Appendix IV. Teal of Appendix IV. Teal of Appendix IV. Teal of Appendix IV. Material of Appendix IV. Material of Appendix IV. Teal of Appendix IV. Teal of Appendix IV. Teal of Appendix IV. Material of Appendix IV. Teal of Appendix IV. Teal of Appendix IV. Teal of Appendix IV. Teal of Appendix IV. Material of Appendix IV. Teal of Appendix IV. Teal of Appendix IV. Teal of Appendix IV. Teal of Appendix IV. Material of Appendix IV. Teal of Appendix IV. Teal of Appendix IV. Teal of Appendix IV. Teal of Appendix IV. </th <th>ž</th> <th>-</th> <th>;</th> <th>:</th> <th></th> <th></th> <th>Measured by</th> <th>Fukui, and</th> <th>Fukui, and 5 the others</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>	ž	-	;	:			Measured by	Fukui, and	Fukui, and 5 the others								
TAVBAS Height (MSL) 157 m Transmitted at TANAY Height (MSL) 530 m ML 513A Transmitted Monured Receiving Anterna ITANAY Height (MSL) 530 m Transmitted ML 513A Transmitted Receiving Anterna Receiving Anterna Itansmitted Transmitted Transmitted Transmitted Transmitted Itansmitted Transmitted Itansmitted Transmitted Itana Transmitted Itana Transmitted Itana	Measured	Week Day (Sun.) 22	Month Nov.		(Rainy, Clo	udy)	Frequency	150.20 MI	12,		MHz		See the Appe	ndix IV.			
ML 518A Tranmitter IFV-225 Advancet Advancet Advancet Tranmitter strainin Reads (ab) Paini (ab) Painini (ab) Painininininini Pain			SAS	Height (Transmitted	· ·	Heig	ht (MSL)			• .			:	
Tanamitrie Field Meanured Field Tanamitrie Field Tanamitrie Field <th>Instrume</th> <th></th> <th>518A</th> <th></th> <th></th> <th></th> <th>Transmitter</th> <th>JHV-225</th> <th></th> <th>• .</th> <th></th> <th></th> <th></th> <th></th> <th>. :</th> <th></th> <th></th>	Instrume		518A				Transmitter	JHV-225		• .					. :		
Meanurel Transmitting Service Station Meanurel Free Service (m) Receiving Anterna. Transmitting Free (m) Meanurel Polariti (m) Transmitting Polariti (m) Transmitting Polariti (m) Meanurel Polariti (m) Transmitting Polariti (m) 202 0 1100 265 9.00 267 20.7 10.0												• .	· .			• • • •	
Meannels Retenting Anterna Transmitting Flagking Seried (ab) Flagking Seried (b) Recenting Anterna Terring fragin (ab)					-		-	•									
Tranniting strain (d) Find strain (d) Height strain (d)	_		Measured			Recei	ving Antenna		•			Tran	smitting Anten	. 41		Output Power	2
TANAY 30.7 H 8 ELE 14.0 345 Tayabas 25 (8D-2V) H YAGI 3.8 20.2 • 13.0 345 Weather 1 (5D-2V) H YAGI 3.8 20.2 • 13.0 5tation 1 (5D-2V) H YAGI 3.8 20.2 • 11.0 Station 1 (5D-2V) H YAGI 3.8 20.2 • 11.0 Station 1 (5D-2V) H YAGI 3.8 229.2 • 11.0 1 (5D-2V) H YAGI 3.8 23.7 10.0 10.0 1 (5D-2V) H YAGI 3.8 23.7 10.0 10.0 10.0 1 (5D-2V) H YAGI 3.8 23.7 10.0 10.0 1 (5D-2V) 1 (5D-2V) H 1 (5D-2V) H H H H H H H H H H H<			Field Strength Value (db)		Type	Height Above the Ground (m)	Direction (deg.)		Length of Coaxial Feeder (m)		Туре	Height Above th Ground (m)			Length of Coarial Feeder (m)	Forward Power	Reflected Power (W)
302 * 13.0 Station 292 * 13.0 Station 285 11.0 * * 285 11.0 * * 285 11.0 * * 285 9.0 * * 2722 10.0 * * 255 9.0 * * 255 9.0 * * 2572 8.0 * * 255 9.0 * * * 2572 8.0 * * * 207 8.0 * * * 177 6.0 * * * * 1154 5.0 * * * * * 132 132 3.3 * * * * * 132 132 3.3 * * * * * * * * * * * * * * *	08:40	TANAY	30.7	н	8 ELE YAGI	14.0	345	Tayabas Weather	25 (8D-2V 1 (5D-2V		8 ELE YAGI			FFWS Repeater	25 (8D-2V) 1 (SD-2V)	25.0	
292 1120 285 1110 285 1100 272 100 272 100 272 900 265 900 237 800 237 800 237 800 177 -600 177 -600 154 50 132 33 132 33			30.2			13.0		Station			•			Station			
28.5 11.0 27.2 10.0 26.5 9.00 26.7 9.00 27.2 9.00 10.0 10.0 26.7 8.0 27.1 10.0 26.7 9.00 17.7 8.0 17.7 6.0 11.7 6.0 11.7 1.0 11.7 9.0 11.7 9.0 11.7 9.0 11.7 1.1 11.7 1.1 11.7 1.1 11.7 1.1 11.7 9.0 11.7 9.0 11.7 9.0 11.7 9.0 11.7 9.0 11.7 9.0 11.7 9.0 11.7 9.0 11.7 9.0 11.7 9.0 11.7 9.0 11.7 9.0 11.7 9.0 11.7 9.0 11.7 9.0 </td <td></td> <td></td> <td>29.2</td> <td></td> <td></td> <td>12.0</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td> </td> <td></td> <td></td> <td>:</td> <td></td>			29.2			12.0							 			:	
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$			28.5			11.0							· · ·				
26.5 9.0 23.7 8.0 20.7 8.0 20.7 7.0 17.7 6.0 15.4 5.0 15.4 5.0 16.0 14.0 13.2 3.8	· .		27.2			10,0								-			
23.7 8.0 20.7 7.0 20.7 7.0 17.7 6.0 15.4 5.0 15.4 5.0 16.0 4.0 13.2 3.8			26.5	·		0.6						-				. i	
20.7 7.0 17.7 6.0 15.4 15.4 16.0 13.2 3.8 3.8			23.7			8.0											
17.7 6.0 15.4 5.0 14.0 4.0 13.2 3.8	÷		20.7			7.0							Rema	.			
15.4 million 14.0		-	17.7		E.	6,0							Recei	ving Antenna H	eight at Tayaba	is for Tanay	(unop)
14.0			15.4		- 	5.0							ž		100		· ·
13.2			14.0			4.0							1 		E C	•	
	08:46		13.2			3.8											
								ан 1913 - С. 1913 - С. 1914 - С. 19									
											:						

		• .		• • • • •		Output Power	Forward Power (W)	25.0					•			for Taya			• •	
. · · ·	PLACE IN						Length of Coaxial Feeder (m)	25 (8D–2V) 1 (5D–2V)				-				ieight at Tanay		E		
	SKETCH OF MEASURING PLACE IN			· .			Location	FFWS Repeater	Station							Transmitting Antenna Height at Tanay for Tayabas (up)		* Max. 31.7 db, 4.0 m		
• .	KETCH OF	•		-		Transmitting Antenna	Direction (deg.)	170							Remarks	Transmit		* Max.		
	S		· · ·	1	-	Transmitt	Height Above the Ground (m)	3.8	4,0	5.0	6.0	7.0	8.0	0.6	10.0	11.0	12.0	13.0	14.0	
1 L		MH ₇	530 m				Type	8 ELE YAGI												
			Height (MSL)				Polari- zation	H H										· .		
		the others					Length of Coaxial Feeder (m)	25 (8D-2V) 1 (5D-2V)			:									
VE (3)		Fukui, and 5 the others 150 20 MHz	TANAY				Location		10						·					
RADIO WI		Measured by Frequency	Transmitted at	Transmitter		Receiving Antenna	Direction (deg.)	345								· · ·				
TH OF VHF			1			Receivi	Height Above the Ground (m)	5.0												
D STRENG		(Rainy, Cloudy)	4SL) 157					8 ELE YAGI			3									
ED FIEI							Polari- zation	H					:							- 4 - 4 1 -
MEASUR		Month Year Nov. 1981	3AS	ML 518A		Measured	Field Strength Value (db)	31.7	31.7	31.7	30.2	27.2	24.2	25.7	27.7	29.2	29.2	26.2	26.2	79.0
TAYABASTANAY MEASURED FIELD STRENGTH OF VHF RADIO WAVE		Week Day (Sun.) 22	- F				Transmitting Station	TANAY	-											
TAYAB	•	Date:	-ĕ	Instrument			Time	08:50												Ш-eu
	÷ .	· · ·	• _								-	 :	i			4			Fit F	

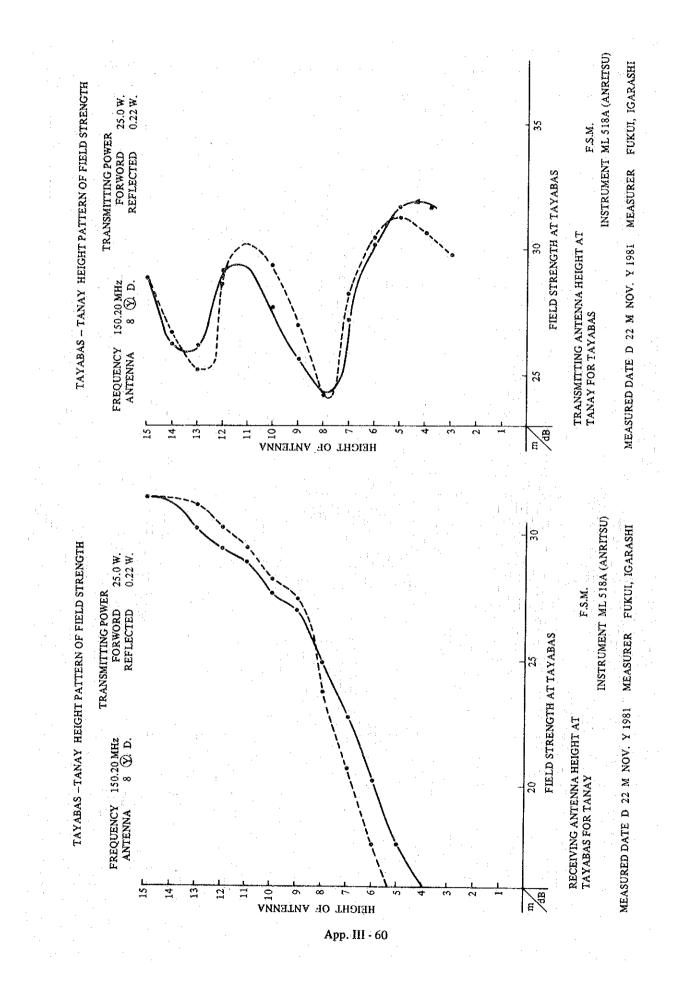
							Output Power	Forward Reflected Power Power (W) (W)	25.0 0.22			- - -					Transmitting Antenna Height at Tanay for Tayabas (down)				· .		
SKEICH UF MEASUKING PLACE IN	· .		:					Length of Coartial Feeder (m)	25 (8D-2V) 1 (5D-2V)			:					a Height at Tan		5.0 m			. *	
								Location	FFWS Repeater	Station							itting Antenn		* Max. 31.2 db, 5				
	. *						Trammitting Antenna	Direction (deg.)	170							Remarks	Transmi		* Max. 3			, 	
·	· .						Transm	Height Above the Ground (m)	15.0	14.0	13.0	12.0	11,0	10.0	0.6	8.0	7.0	6.0	5.0	4.0	3.8	 . 	
	MHz	530 m		1				Туре	8 ELE YAGI														
		Height (MSL)			·			Polari zation	щ														
-	the others	Heigh						Length of Coaxial Feeder (m)	25 (8D–2V) 1 (5D–2V)														
י - ב	Fukui, and 5 the others 150.20 MHz,	TANAY		JHV-225				Location	Tayabas Weather	Station								:					
:	Measured by Frequency	Transmitted at		Transmitter	:		Receiving Antenna	Direction (deg.)	345						:		· :						
		m Tr	· .	٦ ۲			Receivin	Height Above the Ground (m)	5.0														
I	(Rainy, Cloudy)	157			·	-		Type	8 ELE YAGI										· · ·			 ·	
		Height (MSL)						Polari- zation	н														
. •	Month Nov.			ML 518A			Measured	Field Strength Value (db)	28.9	26.7	25.2	28.7	30.2	29.4	27.0	24.2	28.2	30,4	31.2	30.7	29.8		
	Week Day (Sun.) 22	i at TAYABAS						Transmitting Station	TANAY														
	Date:	Measured at		Instrume	·			Time	80			<u></u>							· · ·		09:10		
	Date:	Measured		Instrument						pp. II											06:10		

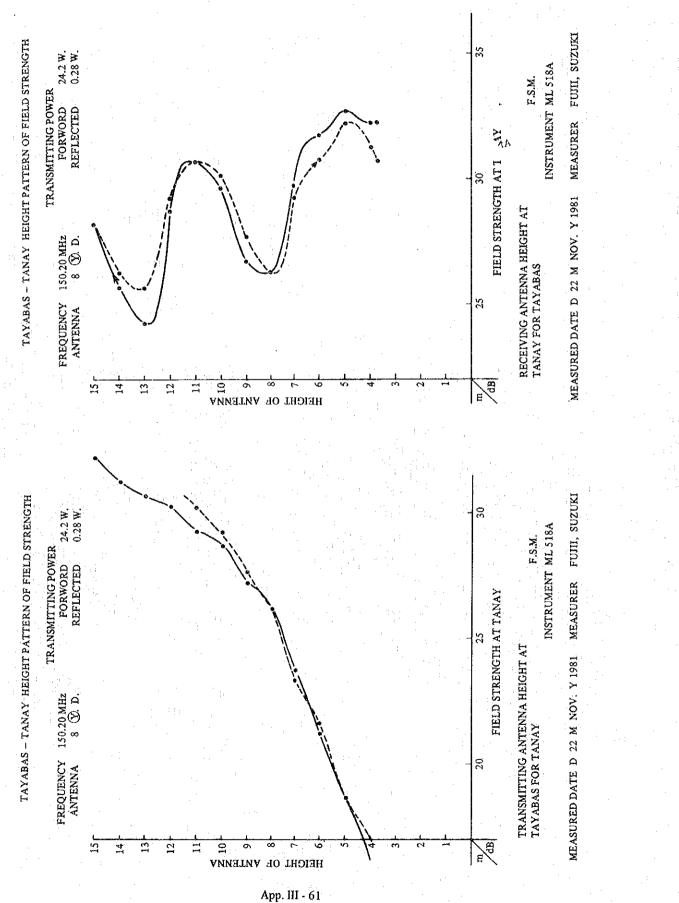
Transmitted at TAYABAS Heigh Transmitter JHV-225 Transmitter JHV-225 Heigh of Keceiving Anterna Receiving Anterna Receiving Anterna (above the Diffection (wove the Diffection (m) (JPO EPOPatien Locazian (above the larged of Locazian (bove the larged of Locazian (above the larged of Locazian (bove the larged of Locazian (above the larged of Locazian (bove the larged of Locazian (c) 170 FFWS 5:0 170 Few Station Height (15D-2V) Trans.	Frequency 150.20 M Transmitted at TAYABA Transmitter JHV-225 e Direction Location (deg.) Location Station
Transmitter e Direction 170 F 170	Transmitter Polari Type Receiving Antenna Receiving Antenna Receiving Antenna Receiving Antenna Polari Type Anowe the Out of (deg.) (m) (m)
	1981 (Rainy, Cloud Height (MSL) 530 Polari- H YAGI Be B B B B B B B B B B B B B B B B B B

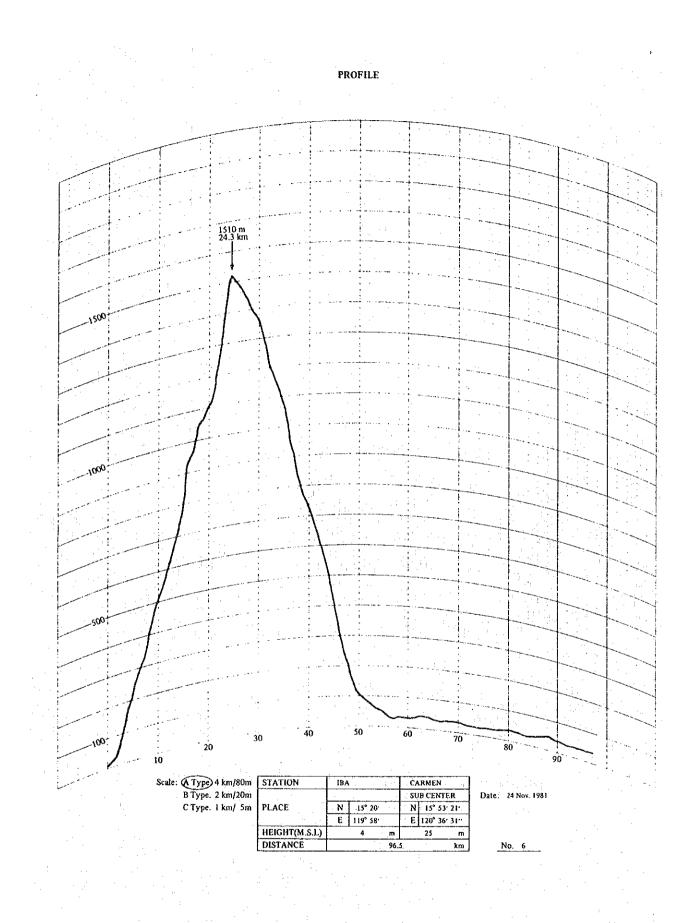
		·		. '		Output Power	Reflected Power (W)	0 28									(dn) (an					
	•					outpe	Forward Power (W)	24.2	· .								bas for Tan	:				
	• .	۰.					Length of Coaxial Feeder (m)	25 (8D-2V) 1 (5D-2V)									Transmitting Antenna Height at Tayabas for Tanay (up)	Ë			•	
			· .				Location	Tayabas Weather	Station							. '	ing Antenna F	32.2 db, 15.0 m	•			
		:				Transmitting Antenna	Direction (deg.)	345							Remarks	· ·	Transmitt	* Max.			1	
·			· · · · · · · · · · · · · · · · · · ·			Transmit	Height Above the Ground (m)	4.0	5.0	6.0	7.0	8.0	0.6	10.0	11.0	12.0	13.0	14.0	15.0			
	MHz	157 m					Турс	8 ELE YAGI	•													
· · · :		Height (MSL)					Polari- zation	H										·				
le others	ŝ	Height	•			- 1 - 1 - 1	Length of Coaxial Feeder (m)	25 (8D-2V) 1 (5D-2V)														
Fujii, and 5 the others	150.20 MHz,	Transmitted at TAYABAS	JHV-225				n où	FFWS Repeater	Station			· · ·								 		
Measured by	Frequency	ansmitted at	Transmitter			Receiving Antenna	Direction (deg.)	170 F														
×		·	L			Receivin	Height Above the Ground (m)	5.0	Best T rans. Height										1			· · ·
	1981 (Rainy, Cloudy)	SL) 530 m						8 ELE YAGI					:								· · · · · ·	
Vest	1981 (Height (MSL)		-1			Poları- zation															
Measured by Fujli, Measured by Fujli,	Nov.		184	-		Measured	Field Strength Value (db)	16.2	18.7	21.2	23.7	26.2	27.2	- 28.7	29.2	30.2	30.7	31.2	32.2			•
Waak Dav	(Sun.) 22	at TANAY	nt ML 518A			~~~~	Transmitting Station	TAYABAS			· · · ·								*			
	Date:	Measured at	Instrument				Time	05:20	: : :	- 14 B M								· · ·	06:30			
-		•			•			A	pp. II	I - 57		· .		·	•					•	• . `	:

						Reflected - Power (W).	0.28								7	2				
			:		Output Power			+ • •					:		hae (u					•.
				:	ð	Forward Power (W)	24.2								for Tava					
						Length of Coaxial Feeder (m)	25 (8D-2V) 1 (5D-2V)		- 1 				· .		icht af Tanav		E			
						Location	Tayabas Weather	Station							Receivine Antenna Heisht at Tanav for Tavahas (* Max. 32.7 db, 5.0 m		•	
SAFILIT OF MEASUARING FLALE IN			· .		Transmitting Antenna	Direction (deg.)	345							Remarks	Receivin		* Max.		· .	-
	· .				Transmit	Height Above the Ground (m)	15.0	Best Trans. Height											-	
	MHz	157 m				Type	8 ELE YAGI		· · ·						:					-
		Height (MSL)				Polari- zation	Н											-		
	he others z,					Length of Coaxial Feeder (m)	25 (8D-2V) 1 (5D-2V)				÷.,					:	÷			
	Fujii, and 5 the others 150.20 MHz,		JHV-225			Location	FFWS Repeater	Station				:								
	Measured by Frequency	Transmitted at	Transmitter		Receiving Antenna	Direction (deg.)	170								· · ·			· · ·		
	•	E	Д		Receivi	Height Above the Ground (m)	8 8 1	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0	
	(Rainy, Cloudy)	MSL) 530				Type	8 ELE YAGI			-										
	Year 1981	Height (MSL)				Polari zation					:									
•	Month Nov.		ML 518A	. :		Field Strength Value (db)	32.2	32.2	* 32.7	.31.7	29.7	26.2	26.7	29.7	30.7	28.7	24.2	25.7	28.2	
	Week Day (Sun.) 22	Measured at TANAY				Transmitting Station	TAYABAS													
	Date:	Measure	Instrument			Time	09:45							· · ·					09:55	
		·		• • •				Δυ	p. III	- 58		1 * 4								

						Output Power	Reflected Power (W)	0.28							-	(umop)				:	
u ,						Output	Forward Power (W)	24.2					-			or Tayabas		H= 15 m H= 5 m			
		:.	:				Length of Coaxial Feeder (m)	25 (8D–2V) 1 (5D–2V)							· ·	Receiving Antenna Height at Tanay for Tayabas (down)	E	Tr. Tayabas Re. Tanav			•
	2						Location	Tayabas Weather	Station				:	· · ·		ig Antenna Hei	* Max. 32.2 db, 5.0 m	·	ŝ	8	
		an a				Transmitting Antenna	Direction (deg.)	345					· .	•	Remarks	Receivir	* Max.	N = - 14 C = - 65	9 9 1 8 8	80 60 = N/S	
		•				Transmitt	Height Above the Ground (m)	15.0	Best Trans. Height								-			-	
: •	MHz 157 m	1	.				Type	8 ELE YAGI							:						
	Height (MSL)	· .			-		Polari- zation	Ħ													
the others							Length of Coaxial Feeder (m)	25 (8D-2V) 				+ 1+ 1									
Fujii, and 5 the others	150.20 MHz, TAYABAS		Transmitter JHV-225			÷.,	Location	FFWS Repeater	Station												
Measured by	Frequency Transmitted at		ansmitter	:		Receiving Antenna	Direction (deg.)	170									 -				•
1944 - -			F			Receivin	Height Above the Ground (m)	15.0	14.0	13.0	12.0	11.0	10.0	0.6	8.0	7.0	6.0	5.0	4.0	3.8	
	ž.	- 		-			Type	8 ELE YAGI													
Year	1981 (Rair Height (MSL)		d l				Polari- zation	H											a - 1		
	Nov.		ML 518A			Measured	Field Strength Value (db)	28.2	27.2	25.7	29.2	30.7	30.2	27.7	26.2	29.2	30.7	* 32.2	31.2	30.7	
	(Sun.) 22 i at TANAY			. :			Transmitting Station	TAYABAS										:			
1.1	Date: (Si Measured at		Instrument	-			Time	\$\$:60											· . !	10:05	· .
	:		:	÷		•	· · ·	· · ·	an I	II - 5	9		1911 -		·			•		:.	







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() Total Height 19 m Si Total Height 19 m Si No. 6 150 m R CARMEN) T 24.3 km 72.2 km R CARMEN) RosALES) Items Estimated Level Diagram Level Diagram of Propergation Test Remarks Calculated Watue Remarks Peeder Loss (Tx) db -2.5 -2.5 m -2.5 - 8D-2V 25 n Antenna Gain (Tx) db -11.0 11.0 - - 8D-2V 25 n Additional Loss S1 db -30.0 - - 36.0 -	Number of Profil	e	Height (MS) Height of A	L) 4 ntenna 15		an a	Height (MSL) Height of Anto	
No. 6 51 150 m 150 m 72.2 km R 1	()	Total He	ght 19			Total Heigh	nt 40 m
No. 6 T 24.3 km 72.2 km R Items (IBA) \rightarrow 96.5 km \rightarrow (CARMEN ROSALES) Items Estimated Level Diagram Level Diagram of Propergration Test Remarks Calculated Corrected Remarks Calculated Value Remarks Feeder Loss (TX) db -2.5 -2.5 m -2.5 + 8D-2V 2.5 n Antenna Gaio (TX) db -115.8 -	•			· .		· · · .		1.
Items Estimated Level Diagram Value CAMMEN ROSALES R ROSALES Peeder Loss (Tx) db - 2.5					1510 m	L		
Items Estimated Level Diagram Value CAMMEN ROSALES R ROSALES Peeder Loss (Tx) db - 2.5								
Items Estimated Level Diagram Level Diagram of Propertation Test Items Estimated Level Diagram Level Diagram of Propertation Test Feeder Loss (Tx) db - 2.5 - 8D-2V 25 n Feeder Loss (Tx) db - 2.5 - 8D-2V 25 n Antenna Gain (Tx) db - 115.8 - - 8D-2V 25 n Stational Loss S1 db - 3.0 - 3.0 - 3.0 - 3.0 - 3.0 - 3.0 - 3.0 - 3.0 - 3.0 - 3.0 - 3.0 - 2.5 - 8D-2V 25 n Additional Loss S1 db - 3.0 - 3.0 - 3.0 - 3.0 - 3.0 - 3.2 -	No. 6							
Items Estimated Level Diagram Level Diagram of Propertation Test Items Estimated Level Diagram Level Diagram of Propertation Test Feeder Loss (Tx) db - 2.5 - 8D-2V 25 n Feeder Loss (Tx) db - 2.5 - 8D-2V 25 n Antenna Gain (Tx) db - 115.8 - - 8D-2V 25 n Stational Loss S1 db - 3.0 - 3.0 - 3.0 - 3.0 - 3.0 - 3.0 - 3.0 - 3.0 - 3.0 - 3.0 - 3.0 - 2.5 - 8D-2V 25 n Additional Loss S1 db - 3.0 - 3.0 - 3.0 - 3.0 - 3.0 - 3.2 -								
Items Estimated Level Diagram Level Diagram of Propertation Test Items Estimated Level Diagram Level Diagram of Propertation Test Feeder Loss (Tx) db - 2.5 - 8D-2V 25 n Feeder Loss (Tx) db - 2.5 - 8D-2V 25 n Antenna Gain (Tx) db - 115.8 - - 8D-2V 25 n Stational Loss S1 db - 3.0 - 3.0 - 3.0 - 3.0 - 3.0 - 3.0 - 3.0 - 3.0 - 3.0 - 3.0 - 3.0 - 2.5 - 8D-2V 25 n Additional Loss S1 db - 3.0 - 3.0 - 3.0 - 3.0 - 3.0 - 3.2 -								
Items Estimated Level Diagram Level Diagram of Properation Test Items Estimated Level Diagram Level Diagram of Properation Test Feeder Loss (Tx) db -2.5 -2.5 m Calculated Value Messured Remarks Feeder Loss (Tx) db -2.5 -2.5 m -2.5 -4 8D-2V 25 n Antenna Gain (Tx) db -115.8 -115.8 -115.8 -115.8 -4 Additional Loss 81 db -30.0 -30.0 -36.0 <td></td> <td></td> <td></td> <td>÷</td> <td>T 24.3 km</td> <td>72.2 km</td> <td></td> <td>DMDN</td>				÷	T 24.3 km	72.2 km		DMDN
Level Diagram Level Diagram of Propergation Text Items Estimated Level Diagram Calculated Value Corrected Value Remarks Calculated Value Remarks Feeder Loss (Tx) db -2.5 m -2.5 + 8D-2V 25 n Antenna Gain (Tx) db 11.0 11.0 + + - <t< td=""><td></td><td></td><td>(IBA</td><td></td><td>)</td><td>96.5 km</td><td></td><td></td></t<>			(IBA)	96.5 km		
Hems Calculated Value Corrected Value Remarks Calculated Value Messured Value Remarks Feeder Loss (Tx) db -2.5 -2.5 m -2.5 + 8D-2V 2.5 n Antenna Gain (Tx) db 11.0 11.0 -115.8 -					· 	r		
Calculated Concernent Remarks Calculated Concernent Remarks Remarks <td></td> <td></td> <td>Esti</td> <td>mated Level I</td> <td>Diagram</td> <td>Level</td> <td>Diagram of Prop</td> <td>ergation Test</td>			Esti	mated Level I	Diagram	Level	Diagram of Prop	ergation Test
Value Value Remarks Value <	Items		Calculated	Corrected		Calculated	Measured	Damasha
Antenna Gán (Tx) db 11.0 11.0 Free Space Loss db -115.8 -115.8 -115.8 Additional Loss \$1 db -33.0 S2 db -36.0 Antenna Gán (Rx) db -110.0		-			Remarks		Value	Kemarks
Antenna Gán (Tx) db 11.0 11.0 Free Space Loss db -115.8 -115.8 -115.8 Additional Loss \$1 db -33.0 - - - S2 db -36.0 -36.0 - - - Antenna Gain (Rx) db -110.0 - - - Antenna Gain (Rx) db 11.0 11.0 - - - Antenna Gain (Rx) db -110.0 11.0 - - - - Coss of Others db -134.8 -138.0 - <t< td=""><td></td><td></td><td></td><td></td><td></td><td>· · · ·</td><td></td><td></td></t<>						· · · ·		
Antenna Gain (Tx) db 11.0 11.0 - Free Space Loss db -115.8 -115.8 -115.8 - Additional Loss S1 db -33.0 - - - Additional Loss S1 db -36.0 - - - Additional Loss S1 db - - - - Additional Cosi B -36.0 - - - - Antenna Gain (Rx) db 11.0 11.0 -	Feeder Loss (Tx)	db	- 2.5	- 2.5	m	- 2,5		8D-2V 25 r
Additional Loss S1 db - 33.0 - 36.0 - 36.0 - 36.0 S2 db - 30.0 - 32.0 - 36.0 - 36.0 - 36.0 Antenna Gain (Rx) db - 11.0 11.0 (- 3.2) Compensatory Val Antenna Gain (Rx) db - 1.0 11.0 (- 3.2) Compensatory Val Feeder Loss (Rx) db - 2.5 m - 2.5 + 8D-2V 25 x Loss of Others db -<		db		11.0			4-	
S2 db - 36.0 - 36.0 - 36.0 - 36.0 Antenna Gain (Rx) db - 30.0 - 32.0 - 36.0 - 36.0 Antenna Gain (Rx) db 11.0 11.0 (- 3.2) Compensatory Value of the second seco	Free Space Loss	db	- 115.8	- 115.8	-	- 115.8	<u>ج</u>	
83 db	Additional Loss	J	- 33.0) :				
db - 3.0 - 3.2 (-3.2) Compensatory Value Antenna Gain (Rx) db 11.0 11.0 -	и.	}		- 36.0		- 36.0	- 36.0	
Antenna Gain (Rx) db 11.0 11.0 \leftarrow 8D-2V Station: Feeder Loss (Rx) db -2.5 -2.5 m -2.5 \leftarrow 8D-2V 25 r Loss of Others db -134.8 -138.0 -134.8 -138.0 -138.0 -134.8 -138.0 -138.0 -134.8 -138.0 -138.0 -134.8 -138.0 -134.8 -138.0 -134.8 -138.0 -138.0 -134.8 -138.0 -138.0 -134.8 -138.0 -138.0 -134.8 -138.0 -134.8 -138.0 -138.0 -134.8 -138.0 -138.0 -138.0 -134.8 -138.0 -138.0 -138.0 -134.8 -138.0 -138.0 -138.0 -138.0 -138.0 -138.0 -138.0 -138.0 -138.0 -138.0 -134.8 -138.0 -148.7 -148.7 -148.7 <td></td> <td>j</td> <td></td> <td> · · · · · ·</td> <td> </td> <td></td> <td></td> <td></td>		j		 · · · · · ·				
Alterina Gold (CR) db -2.5 -2.5 m -2.5 + 8D-2V 25 r Loss of Others db -		L		f:	: · · · · · · · · · · · · · · · · · · ·	1.1.2.1		Compensatory Valu
Loss of Others db </td <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>80-21/25</td>								80-21/25
Total Loss db - 134.8 - 138.0 - 134.8 - 138.0 Transmitting Power db/w 13.98 13.98 w 13.98 13.98 25 Receiving Power db/w - 124.02 (1) - 120.8 db/w (2) - 124.0 dB/W Antenna Threshold Level db/w - 144.7 - 144.7 F 9.5 db (2) 18.7 db/µ Neasured Height of Threshold S/N db 23.88 20.68 - 3.2 db/µ Field Strength Receiver Transmitting Standard S/N db 45.1 41.9 - - 12.7 7.0 m 7.0 m 7.0 m Standard S/N db 9.7 9.7 - 150.20 MHz 14.7 10.0 16.7 12.0 16.7 12.0 16.7 13.0 16.7 12.0 16.7 13.0 15.7 11.0 16.7 12.0 16.7 13.0 15.0 1 15.0 1 15.0 1 16.7 12.0 15.0 1 15.0 1 15.0 1 15.0 1	the state of the s		- 2.5	- 2,5	<u> </u>	- 2.3		0D-2V 25 1
Totansmitting Power db/w 13.98 13.98 13.98 13.98 25 Receiving Power db/w - 120.82 - 124.02 (1) -120.8 db/w (2) -124.0 dB/W Antenna Threshold Level db/w - 144.7 - 144.7 F 9.5 db (1) 21.9 db/µ Measured Value of Height of Threshold Level db/w - 144.7 - 144.7 F 9.5 db (2) 18.7 db/µ Measured Value of Height of Threshold Margin db 23.88 20.68 - - - 3.2 db/µ Receiver. Transmitter Standard S/N db 45.1 41.9 - - 3.2 db/µ 12.2 8.0 - 12.7 7.0 m 7.0 m 7.0 m 12.0 14.7 10.0 - 15.7 11.0 - 15.7 11.0 - 16.7 13.0 - 16.7 13.0 - 16.7 13.0 - 16.7 13.0 - 16.7 13.0 - 150.20 Measuied Date: D 27 M			- 134.8	- 138.0		- 134.8	- 138.0	
Receiving Power db/w - 124.02 (1) -120.8 db/w (2) -124.0 dB/W Threshold Level db/w - 144.7 - 144.7 F 9.5 db (2) 18.7 db/µ Measured Value of Threshold Margin db 23.88 20.68 Threshold S/N db 21.2 21.2 21.2 21.2 Receiver Transmitt Standard S/N db 45.1 41.9 Estimated Fading Loss db 9.7 9.7 150.20 MHz S/N = 43 dB 14.7 10.0 14.7 10.0 14.2 9.0 14.2 9.0 14.2 9.0 14.2 9.0 14.7 10.0 14.7 10.0 14.2					w	h		25
Image: constraint of the system Image: constraint of the system Image: constraint of the system Antenna Height of Value of Va				·	*	1		··· • ··· ··· ··· ··· ··· ··· ··· ··· ·
Threshold Level db/w - 144.7 - 144.7 B T2 KHz Value of Height of Threshold Margin db 23.88 20.68 - - 3.2 db/µ Receiver Transmitt Threshold S/N db 21.2 21.2 B KHz - - 12.7 7.0 m 7.0 m Standard S/N db 45.1 41.9 - - 150.20 MHz 14.2 9.0 - 12.7 7.0 m 7.0 m 7.0 m 12.2 8.0 - 12.2 8.0 - 12.2 8.0 - 14.7 10.0 - 10.1	Keeen Tig I over	00,11						
- 144.7 - 144.7 F 9.5 db)(2) 18.7 db/µ Field Strength Receiver Transmit Threshold Margin db 23.88 20.68 mo r/ch - 3.2 db/µ Strength Receiver Transmit Standard S/N db 45.1 41.9 - - 12.2 8.0 12.2 8.0 12.2 8.0 12.2 8.0 12.2 8.0 12.2 8.0 12.2 8.0 12.2 8.0 12.2 8.0 12.2 8.0 12.2 8.0 12.2 8.0 12.2 8.0 12.2 8.0 12.2 8.0 12.2 13.0 12.2 14.2 9.0 18.7 11.0 12.2 15.0 14.7 10.0 15.7 11.0 16.7 12.0 15.7 11.0 16.7 13.0 16.7 13.0 16.7 13.0 16.7 13.0 18.7 15.0 16.7 15.0 16.7 15.0 150.20 ME 150.20 ME 150.20 ME 150.20 ME 150.20 ME <td>Threshold Level</td> <td>do/w</td> <td>+ 1 · · · ·</td> <td>n Friday (Salar</td> <td>B 12 KHz</td> <td></td> <td>Value of</td> <td>Height of</td>	Threshold Level	do/w	+ 1 · · · ·	n Friday (Salar	B 12 KHz		Value of	Height of
Threshold S/N db 21.2 21.2 mo r/ch Standard S/N db 45.1 41.9 12.7 7.0 m 7.0 m Estimated Fading Loss db 9.7 9.7 12.2 8.0 14.2 9.0 12.2 8.0 12.2 8.0 12.2 8.0 12.2 8.0 12.2 8.0 12.2 8.0 12.2 8.0 12.2 8.0 12.2 8.0 12.2 8.0 12.2 8.0 12.2 8.0 12.2 8.0 14.2 9.0 12.2 10.0 15.7 11.0 15.7 11.0 16.7 12.0 16.7 13.0 16.7 13.0 16.7 13.0 16.7 13.0 16.7 15.0 16.7 15.0 16.7 15.0 16.7 15.0 16.7 15.0 16.7 150.20 MF Measured Date: D 27 M Nov. Y 1981 150.20 MF 150.20			- 144.7	- 144.7	F 9.5 db	-)(2) 18.7 db/µ		
1110/shold (M) 21.2 21.2 B KHz Standard S/N db 45.1 41.9 12.2 8.0 12.2 8.0 12.2 8.0 12.2 8.0 12.2 8.0 12.2 8.0 12.2 8.0 12.2 8.0 12.2 8.0 12.2 8.0 12.2 8.0 12.2 8.0 12.2 8.0 12.2 8.0 14.2 9.0 15.7 11.0 16.7 12.0 15.7 11.0 16.7 12.0 16.7 13.0 17.7 14.0 18.7 15.0 1 18.7 15.0 1 15.0, 20 MHz 150.20 MEasured Date: D 27 M Nov. Y 1981 150.20 MHz	Threshold Margin	db	23.88	20.68	[- 3.2 db/µ	Strength	Receiver Transmit
Standard S/N db 45.1 41.9 Estimated Fading Loss db 9.7 9.7 12.2 8.0 14.2 9.0 Frequency 150.20 MHz 14.7 10.0 15.7 11.0 16.7 12.0 16.7 12.0 16.7 13.0 16.7 12.0 16.7 13.0 17.7 14.0 18.7 15.0 1 16.7 12.0 16.7 13.0 17.7 14.0 18.7 15.0 1 18.7 15.0 1 15.0.20 MHz 18.7 15.0 1 15.0 1 15.0.20 1 15.7 11.0 1 10.7 14.0 1 </td <td>Threshold S/N</td> <td>db</td> <td>21.2</td> <td>212</td> <td></td> <td></td> <td></td> <td></td>	Threshold S/N	db	21.2	212				
Stationard G/N 00 14.1 11.0 Estimated Fading Loss db 9.7 9.7 150.20 MHz Frequency 150.20 MHz 14.2 9.0 14.7 10.0 Remarks: 150.20 MHz 16.7 12.0 15.7 11.0 16.7 12.0 16.7 13.0 16.7 13.0 16.7 13.0 18.7 15.0 1 15.0 1 16.7 13.0 16.7 15.0 1 15.0 1 16.7 13.0 15.0 1 15.0 1 15.0 1 15.0 1 150.20 Measured Date: D 27 M Nov. Y 1981 150.20 150.20 MHz				1.194				
Similar of rading 2003 do 2.1 2.1 10 Frequency 150,20 MHz 14.7 10.0 Remarks: 150,20 MHz 16.7 12.0 16.7 13.0 16.7 13.0 17.7 14.0 18.7 15.0 1 (Received at CARMEN) 18.7 15.0 1 Measured Date: D 27 M Nov. Y 1981 150,20 MHz 150,20 MHz 150,20 MHz Noted Date: D 24 M Nov. Y 1981 Station: 10 24 Mov. Y 1981								
Remarks: 15.7 11.0 16.7 12.0 16.7 13.0 17.7 14.0 18.7 15.0 (Received at CARMEN) Measured Date: D D 27 Measured Date: D 150.20 MH Instrument: Field Strength Meter ML-518A Transmitter: FM Transceiver JHV-225		s db	9.7	9.7	160.20 100			
Remarks: 16.7 12.0 16.7 13.0 1 17.7 14.0 1 18.7 15.0 1 (Received at CARMEN) Measured Date: D 27 M Nov. Y 1981 150,20 MF 1 Instrument: Field Strength Meter ML-518A Transmitter: FM Transceiver JHV-225 Noted Date: D 24 M Nov, Y 1981 Station:	riequency		L	k	1 150.20 MH	¶ ^		
Remarks: 16.7 13.0 17.7 14.0 1 18.7 15.0 1 (Received at CARMEN) (Received at CARMEN) Measured Date: D 27 M Nov. Y 1981 Instrument: Field Strength Meter ML-518A Transmitter: FM Transceiver JHV-225 Noted Date: D 24 M Nov. Y 1981 Station: Station: Station: Station: Station:					, ne n			
17.7 14.0 18.7 15.0 (Received at CARMEN) Measured Date: D D 27 Measured Date: D D 27 Measured Date: D Noted Date: D D 24 Mov. Y 1981 Station:	Remarks:							
(Received at <u>CARMEN</u>) Measured Date: D 27 M Nov. Y 1981 150,20 MH Instrument: Field Strength Meter ML518A Transmitter: FM Transceiver JHV-225 Noted Date: D 24 M Nov. Y 1981 Station:	- 44 - ¹	. je:				\		
Measured Date: D 27 M Nov. Y 1981 150,20 MH Instrument: Field Strength Meter ML518A Transmitter: FM Transceiver JHV-225 Noted Date: D 24 M Nov. Y 1981 Station:	· ·		- 14			· · ·	18.7	15.0 1 1
150,20 MH Instrument: Field Strength Meter ML518A Transmitter: FM Transceiver JHV-225 Noted Date: D 24 M Nov, Y 1981 Station:							(Received at C	ARMEN)
150,20 MH Instrument: Field Strength Meter ML518A Transmitter: FM Transceiver JHV-225 Noted Date: D 24 M Nov, Y 1981 Station:					11 - 11 - 11 - 11 - 11 - 11 - 11 - 11			· · ·
150,20 MH Instrument: Field Strength Meter ML518A Transmitter: FM Transceiver JHV-225 Noted Date: D 24 M Nov, Y 1981 Station:	t a		÷.,					
150,20 MH Instrument: Field Strength Meter ML518A Transmitter: FM Transceiver JHV-225 Noted Date: D 24 M Nov, Y 1981 Station:						Magnirad Data	D 27 M N	ov. Y 1981
Instrument: Field Strength Meter ML518A Transmitter: FM Transceiver JHV-225 Noted Date: D 24 M Nov, Y 1981 Station:			· .		· · ·	measures Date.	47 40 DI 19	
Transmitter: FM Transceiver JHV-225 Noted Date: D 24 M Nov. Y 1981 Station:		19 ¹⁰ 1				Instrument: Fie	ld Strength Meter	ML-518A
Noted Date: D 24 M Nov. Y 1981 Station:				1. A. A.		Transmitter: FM	Transceiver JHV	-225
				· : ·				
					- . ·		· · ·	
	en an		and a second		and the second			
	Noted Date: D 2	4 M	Nov. Y	1981	Static	ມ ທາ:		
App. III • 63								
					App. III · 63			

					Output Power	Reflected Power (W)	0.2			· · · .					(an)		•		·	
MEN		•		•••	Outpu	Forward Power (W)	24.2													
SKETCH OF MEASURING PLACE IN CARMEN		· · · · ·	· · · ·			Length of Coarial Feeder (m)	25 (8D–2V) 1 (5D–2V)	,							Receiving Antenna Height at Iba for Carmen		7,0 – 8.0 m	•••		
SURING PL	× Z			•		Location	FFS Sub-Center								Antenna Heis		18.7 db 7.0			
CH OF MEA	See the Appendix IV.				Transmitting Antenna	Direction (deg.)	220°				:			Remarks	Receiving		Max: 15		•	
SKET					Transmit	Height Above the Ground (m)	8.0											-		
	forales, Santo MHz	25 m				Type -	8 ELE YAGI													
. ·	Maraña, N	Height (MSL)	25W C)			Polari- zation	Ŧ	- - -												
	hi, Fontano, Iz,	Ι.	FM Transceiver 150MHz Model: JHV-225 (JR			Length of Coaxial Feeder (m)	25 (8D-2V) 1 (5D-2V)					in de la composition de la com					:	·	·	
Ξ	Fukui, Igarashi, Fontano, Marafia, Morales, Santos 150.20 MHz, MHz	N 15°53'21" Transmitted at CARMEN	FM Transceiver 150MHz 2 Model: JHV-225 (JRC)			Location	lba Weather	Station					1	-						
NADIO WAVE	Measured by Frequency	ransmitted at	Transmitter		Receiving Antenna	Direction (deg.)	30°													
JE. Y EIA CALL	æ u.		Т		Receivi	Height Above the Ground (m)	3.8	4.0	5.0	6.0	7.0	8.0	0'6	10.0	0.11	12.0	13.0	14.0	15.0	
CANNER THE MERSONED FIELD SINENUI OF THE	(Fair)	- 44	(ns			Type	8 ELE YAGI													
	Month Year Nov. 1981	Height (MSL)	leter 8A (Anrit		;	Polari- ration	Ŧ								· · ·	-		а. 		
THUNGY		N 15°20' E119°58'	Field Strength Meter Model: ML 518A (Anritsu)		Measured	Field Strength Value (db)	14.7	14.4	15.5	18.0	* 18.7	* 18.7	17.4	14.2	7.7		8.0	13.2	16.0	
	Week (Fri)	N Measured at IBA E1				Transmitting Station	CARMEN													
	Date:	Measure	Instrument			Tune	08:20												08:25	
			: ` 		• •			Ap	p. III	- 64	· .								•	

CARMEN-IB.	A MEAS	URED	FIELD	STRENGT	H OF VH	CARMEN IBA MEASURED FIELD STRENGTH OF VHF RADIO WAVE	(2)			SKETCH OF MEASURING PLACE IN 18A	CE IN IBA
		•		- 1 - 1		Measured by	Measured by Fukui, and 5 the others	others	· · · · · · · · · · · · · · · · · · ·		
Week Day Month Y. Date: (Fri.) 27 Nov. 19	Week Day Month (Fri.) 27 Nov.	Month Nov.	Year 1981	ear 981 (Fair)		Frequency	Frequency 150.20 MHz,		MHz	See the Appendix IV.	
Measured at	IBA		Height (Height (MSL) 4	ε	Transmitted at	Fransmitted at CARMEN	Height (MSL) 25 m	25 ш		
Instrument	ML 518A	84			et, e	Transmitter	JHV-225		- - - -		

•					Output Power	Forward Reflected Power Power (W) (W)	24.2 0.2			• 1				÷.,	ten (down)	·	·		•	· :
						Length of For Coaxial Po Feeder (m)	25 (8D–2V) 1 (5D–2V) 2							•	Receiving Antenna Height at Iba for Carmen	• .	E	. [.]	·	
						Location				 :.			· ·	:	nna Height a		, 6.0 – 7.0 m			
ч. Т.	See the Appendix IV.		·		una .) ^e FFS Sub-Center							Remarks	eiving Anter	1	Max. 18.9 db,			
	See the Ap				Transmitting Antenna	Direction (deg.)	220							. Rem	Rec		May		[
				·	Trans	Heighr Above the Ground (m)	8.0						-				:	:		
	MHz	. 25 т				Type	8 ELE YAGI									· .:		:	3	-
		Height (MSL)				Polari- zation	x			:										
the others	łz,			··· ·		Length of Coaxial Feeder (m)	25 (8D-2V) 1 (5D-2V)			÷		· · ·								
Fukui, and 5 the others	150.20 MHz,	CARMEN	JHV-225			Location	lba Weather	Station		1										
Measured by	Frequency	Transmitted at	Transmitter		Receiving Antenna	Direction (deg.)	30°				• :									
2		н Е			Receivi	Height Above the Ground (m)	15.0	14.0	13.0	12.0	11.0	10.0	9.0	8.0	7.0	6.0	5.0	4.0	3.8	
	(Fair)	4				Type	8 ELE YAGI							:						
	Year 1981	Height (MSL)				Polari- zation	H					: :								
		-	ML 518A		Measured	Field Strength Value (db)	16.0	14,4	8.2	.]	8.0	13.9	16.7	18.2	18.9	* 18.9	16.7	15.2	-14.7	
•	Week Day (Fri.) 27	lat IBA				Transmitting Station	CARMEN											•		
	Date:	Measured at	Instrument			Time	08:25												08:30	
		•		· · · ·			A	pp. II	I - 65					·		•	. *	·		•

		: .			Forward Refie Power Pow) 27.5) 				4.			ien for Iba			•		
				.:	Length of Coartal	E (E	25 (8D-2V) 1 (5D-2V)								eicht at Canr	, .)	15.0 m			
		· ·			Location		Iba Weather	Station							Receiving Antenna Heicht at Carmen for Iba		Max. 19.7 db, 15			
					Direction	(18ap)	30					1		Remarks	Receivir		Max.			
					Height Above the	(m)	8.5													
MHz	4	· .	:		Type		8 ELE YAGI	·····				· ·								
	Height (MSL)				Polari	zacion	н							: . 						
& 4 others 2,	Heigh	۰.			Length of Coaxial	(m)	25 (8D–2V) 1 (5D–2V)								-					
Fujii, Suzuki & 4 others 150.20 MH2,	IBA	JHV-225			Location		rrS Sub-Center													
Measured by Frequency	Transmitted at	Transmitter			g Automat Direction		530							· · · · · · · · · · · · · · · · · · ·						
۹ ۱	E E	Ĩ			Height Above the	(m)	3.8	4.0	5.0	6.0	7.0	8.0	0.6	10.0	11.0	12.0	13.0	14.0	* 15.0	•
(Fair)	25		•		Type		8 ELE YAGI													
	Height (MSL)				Polari		Н									ei.			: : .	
Month Year Nov. 1981	Z	ML 518A	· · ·		Measured Field Strength Value	(qp)	10.7	10.7	12.7	12.7	12.7	14.2	13.7	15.7	16.2	17.2	18.2	18.7	* 19.7	
Week Day (Fri.) 27	Measured at CARMEN				Transmitting Station		IBA							· · · ·						
Date:	Measure	Instrument			Time		08:30	·							-				08:37	 ·

onth Year lov. 1981 (Fair) lov. 1981 (Fair) Height (MSL) 25 пп ви ви ви ви ви ве ви пе ви пе ви пе ви пе ви пе ви пе ви пе ви пе ви пе ви пе ви пе ви по по б.7 Н В.7 Н России (то) б.7 Н В.7 Н России (то) б.7 В.7 Н России (то) б.7 В.7 Н России (то) б.7 В.7 Н России (то) б.7 В.7 В.7 В.7 В.7 В.7 В.7 В.7 В.7 В.7 В	Suzuki & 4 others 0 MHz, MHz	A Height (MSL) 4 m	225	Transmitting Antenna	Length of Length of Height Caxial Polari Caxial Polari Type Above the Drection Feeder zation (m) (m)	10							Remarks		Receiving Antenna Height at Carmen for Iba (down)	Max, 19.7 db, 15.0 m	
onth Year lov. 1981 (Fair) Height (MSL) Height (MSL) Height (MSL) Height (MSL) H YAG 6.7 H R ELI 8.7 H YAG 6.7 C C C C C C C C C C C C C C C C C C C	Measured by Fujii, Suzuki & 4 others Frequency 150.20 MHz,	E	Transmitter JHV-225	Receiving Antenna	Height Abave the Ground (m)	220		12.0	11.0	10.0	0.6		7.0	6.0	5.0	0	
	Month Year Nov. 1981 (Fair)		ML 518A	eastrred	Polari- zation Type	H	17.2	16.7	16.7	14.7	14.2	12.2	10.2	8.7	7.2	5.2	4.7

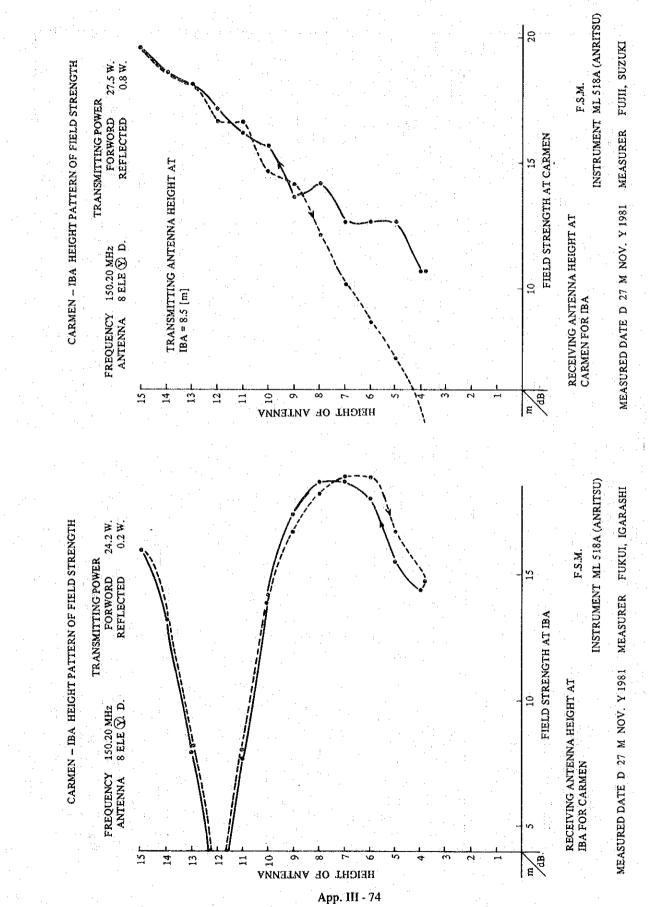
				Custour Power	Length of Forward Coartial Power Feeder (W)	25 (8D–2V) 1 (5D–2V) 24.2								umen for Ib		· · ·		
						25 (8D-2V) 1 (5D-2V)				al da F				· H				
					g									Height at Ca	. • •. •			. • *
				1.	Location	FFS Sub-Center								Transmitting Antenna Height at Carmen for Iba (down)	: ¹	19.0 db, 15.0 m		
				Transmitting Antenna	Direction (deg.)	220							Remarks	Transmit		Max. 19		•
	1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -			Transmitt	Height Above the Ground (m)	15.0	14.0	13.0	12.0	11.0	10.0	0.6	8.0	7.0	6.0	5.0	4.0	
	MHz 25 m				Type	8 ELE YAGI												
	Height (MSL)				Polari- zacion	Н							· · ·					
the others					Length of Coaxial Feeder (m)	25 (8D-2V) 1 (5D-2V)					-							
	150.20 MHz, t CARMEN	JHV-225			Location	Iba Weather	Station				· · · · ·				. : .	- - -		
Measured by	Frequency Transmitted at	Transmitter		Receiving Antenna	Direction (deg.)	30												
- 1 -		T		Receivi	Height Above the Ground (m)	7.0												
	4	· · · ·			Type	8 ELE YAGI						:						
Month Year	Nov. 1981 (Fair Height (MSL)				Polari- zation	T												
		518A		Meanured	Field Scrength Value (db)	19.0	18.7	18.5	17.2	16.5	15.7	14.0	13.7	14.2	12.2	10.2	8.2	
	(Fri.) 27 d at IBA	ent ML 518A			Transmitting Station	CARMEN												
	Date: (Fr Measured at	Instrument	i Bagit Tiri Santa Santa Santa Santa Santa Santa		1)me	00:60						_					09:10	

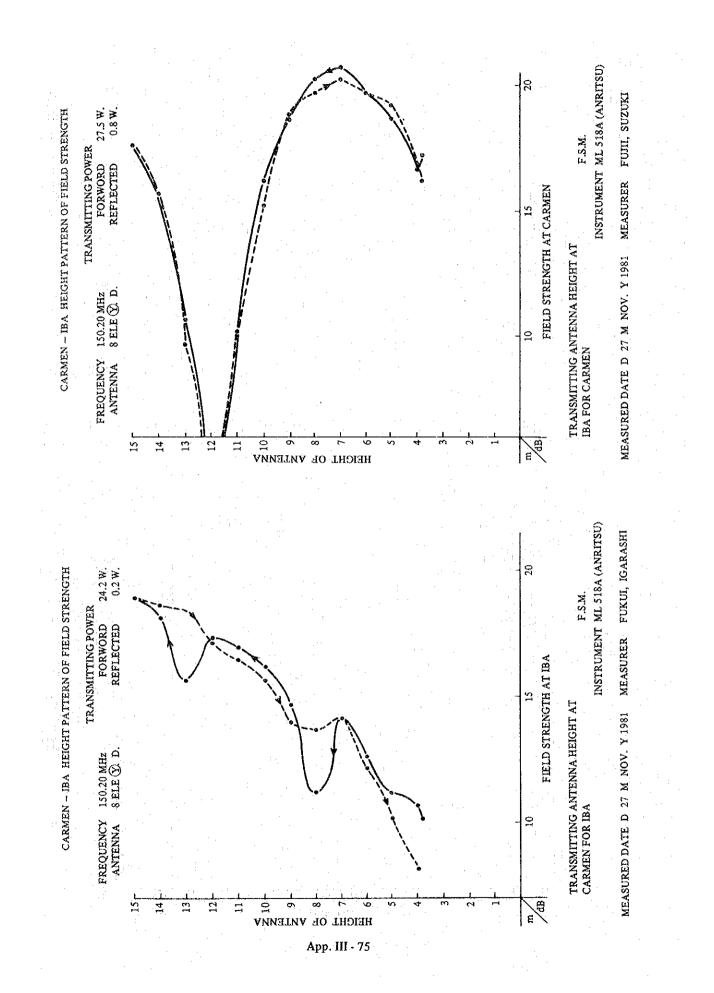
							Power	Reflected Power (W)	0.8							÷.	(dn)	•	•			
	:- :						Output Power	Forward Power (W)	27.5								for Carnen	. :		•		
SKETCH OF MEASUKING PLACE IN				нц. — 4 - -				Length of Coardal Feeder (m)	25 (8D-2V)					1.1			Transmitting Antenna Height at Iba for Carmen (up)		E		·	•
MEASUKIN				· · · · · · · · · · · · · · · · · · ·				Location	Iba Worther	Station							itting Antenna	- - - -	Max. 20.7 db, 7.0 m			
KETCH OF			:		;		Transmitting Antenna	Direction (deg.)	30	-						Remarks	Transm		Max. 2			
	· · ·			<u>.</u>			Transmitt	Height Above the Ground (m)	3.8	4.0	5.0	6.0	7.0	8.0	0.6	10.0	11.0	12.0	13.0	14.0	15.0	
		MHz	4 E				-	Type	8 ELE VACI	1041												
	• • •••		Height (MSL)		· · ·			Polari- zation	H							. :		:				
	& 4 others	2,	Heigh				- 	Length of Coaxial Feeder (m)	25 (8D-2V)													
	Fujii, Suzuki & 4 others	150.20 MH2,	IBA	JHV-225		•		Location		Sub-Center												
JU WAVE	Measured by	Frequency	Transmitted at	Transmitter JHV-225			Receiving Antenna	Direction (deg.)	220													
CARMENIBA MEASURED FIELD SI KENGIH UP VHP KADIU	4	~	. ε				Receivi	Height Above the Ground	15.0	(The Best Receiving	Height)											
IKENGIH		(Fair)	25					Type	8 ELE	IAUI								1. 1				
LIELU		Month Year Nov. 1981 (Fair)	Height (MSL)		1000 1000 1000	·• .		Polari- tation	Ŧ													-
ASURED		Month	CARMEN	ML S18A			Measured	Field Strength Value (db)	17.2	16.7	18.7	19.7	20.7	20.2	18.7	16.2	10.2	- 4.8	10.7	15.7	17.7	
N-1BA ME		Week Day (Fri.) 27	1					Transmitting Station	IBA													
CARME		Date:	Measured at	Instrument				1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	09:15												09:24	

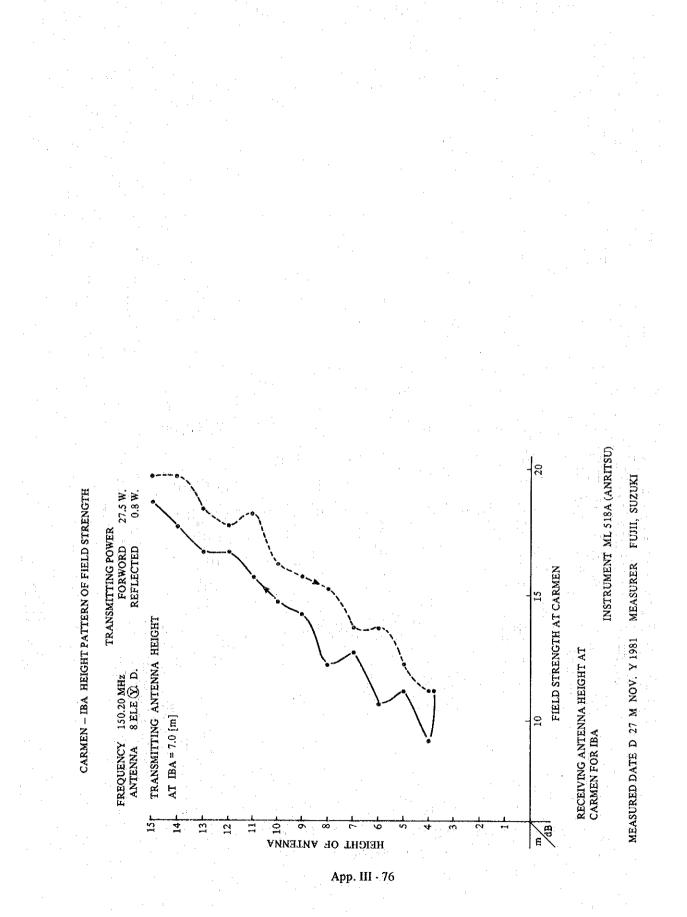
	· · · · · · · · · · · · · · · · · · ·	• .		Output rower	Length of Forward Reflected Coartail Power Power Feeder (W) (W)	25 (8D–2V) 1 (5D–2V) 27.5 08								Transmitting Antenna Height at Iba for Carmen (down)	· ·				
: *		·	•		Location	Iba 2. Weather	Station							itting Antenna H		20.2 db, 7.0 m			
	· .			Transmitting Antenna	Direction (deg.)	30				· ·			Remarks	Transm		Max.		•	
		· · ·	<u></u>	Iransmit	Height Above the Ground (m)	14.0	13.0	12.0	11.0	10.0	0.6	8.0	7.0	6.0	5.0	4.0	3.8		-
MHz	4 E				Type	8 ELE YAGI													
	Height (MSL)	· · ·			Polari- zation	H													
te others	Heigh	· · · . ·		1	Length of Coaxial Feeder (m)	25 (8D-2V) 1 (5D-2V)								- 					
Fujii, and 5 the others 150.20 MHz,	IBA	JHV-225			Location	FFS Sub-Center					-								
Measured by Frequency	Transmitted at	Transmitter		Receiving Antenna	Direction (deg.)	220			· · · · ·	:									
Σ ₽.	н . е	H		 Receivii	Height Above the Ground (m)	15.0										1			
(Fair)	25				Type	8 ELE YAGI													
Month Year Nov. 1981	Height (MSL)				Polari- zation	Ħ													
	CARMEN	ML 518A		Measured	Field Strength Value (db)	15.7	6.7	- 2.8	10.2	15.2	18.9	19.7	20.2	19.7	19.2	16.7	16.2		
Week Day (Fri.) 27	· · · · ·				Transmitting Statton	IBA													
Date:	Measured at	Instrument			Time	09:24									. •		06:30		

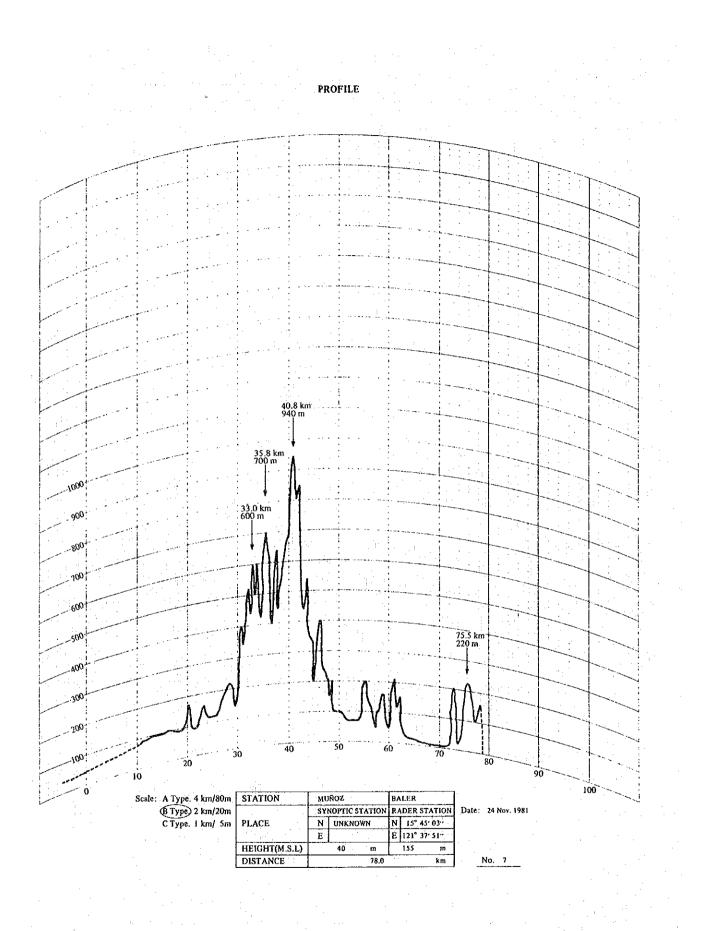
	• • • • • • • •			Output Power	Reflected		8 0					- 6 -			(4cm)	(amon)	·. . · ·			• .
z				Out	Forward	<u>`</u>	27.5								-11- 					
G PLACE I	· . :				Length of Coartal Feeder	(m) 25 (8D-2V)	1 (SD-2V)								aht at Carme) - 15 m			
SKETCH OF MEASURING PLACE IN					Location	Jba	Weather Station		1		-	4			Receiving Antenna Height of Commen for the	1717 BIIII7111 9	19.7 dB, 14.0 – 15 m		· . ·	:
KETCH O	• • •			Transmitting Antenna	Direction (deg.)		30							Remarks	Receivin		Max.	:		
				Transmitt	Height Above the Ground	(m)	7.0 (The Best	Transmitting Height)												
MHz	4 E				Type	8 ELE	YAGI													
	Height (MSL)				Polari- zation		æ													
he others z,	Heig				Length of Coaxial Feeder	(m) 25 (8D-2V)	1 (5D-2V)													
(9) Fujii, and 5 the others 150.20 MHz	IBA	JHV-225			Location	FFS	Sub-Center									* 				
Measured by Frequency	Transmitted at	Transmitter		Receiving Antenna	Direction (deg.)		0.77									. : :				
STRENGTH OF VIT KADOU WAVE Measured by (Fair) Frequency	F	F		Receivin	Height Above the Ground	(E)	D.CI	14.0	13.0	12.0	11.0	10.0	0.6	8.0	7.0	6.0	5.0	4.0	3.8	
) SI KENGI H (Fair)	33		· · ·		Type	8 ELE	YAGI													
ribud Year 1981	Height (MSL)			1.0	Polari- tation	з	G													
ASUKED Month Nov.	EN	ML 518A		Measured	Field Strength Value (db)	- ot	7.71	1.61	18.4	17.7	18.2	16.2	15.7	15.2	13.7	13.7	12.2	11.2	11.2	
UANMENIBA MEASUKED FIELD Week Day Month Year Date: (Fri) 27 Nov. 1981	ed at CARMEN	Instrument ML			Transmitting Station	IBA	Va													- - -
LANNA Date:	Measured at	Instrum	4 12 411		Time	55.00	6.9) 						09:40	

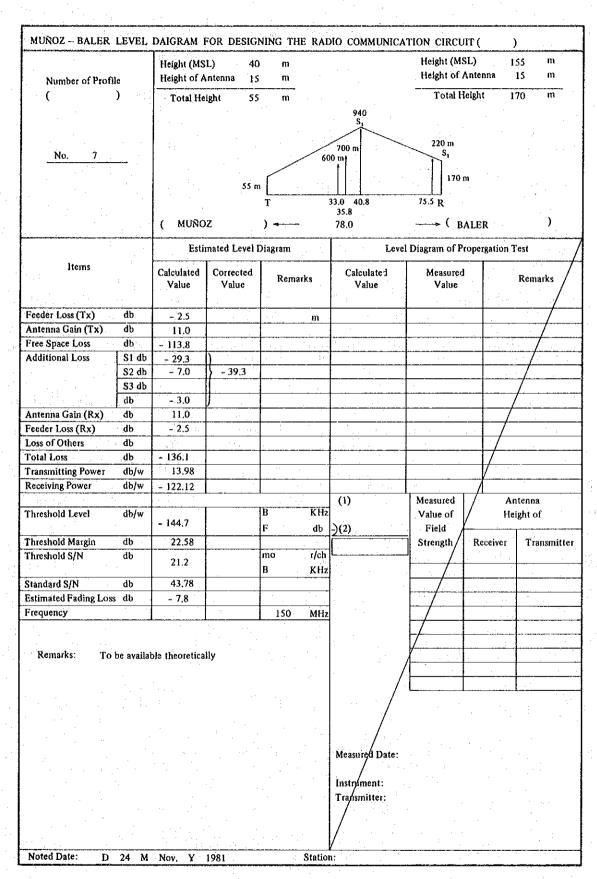
				Output Former	Forward Reflected Power Power (W) (W)	27.5 0.8				•				r Iba (up)		Ш = 70 [m]	= 15.0 [m]		
					·····	25 (8D-2V) 1 (5D-2V)								it at Carmen fo		Tv +t lba	DCB		
					Location	Iba 25 Weather I						; 		Receiving Antenna Height at Carmen for Iba (up)	18.7 dB, 15 0 m	-		ģB	
		· . :		Transmitting Antonna	Direction (deg.)	30	02						Remarks	Receiving	Max. 18	N = _ 15 dB	C = - 51 dB S = -8 dB	S/N = 43 dB	
(Transmitti	Height Above the Ground (m)	7.0	(The Best Transmitting	Height)											
MHz	4 6				Type	8 ELE YAGI	1					•							
	Height (MSL)				Polari- zation	Ŧ													
the others	Heigh				Length of Coaxial Feeder (m)	25 (8D-2V) I (5D-2V)													
Fukui, and 5 the others 150.20 MHz,	IBA	Transmitter JHV-225			Location	FFS Sub-Center							-						
Measured by Frequency	Transmitted at	ansmitter		g Antenna	Direction (deg.)	220										· · · ·			
یک <mark>الا</mark>	E	Tr		Receiving Antenna	Height Above the Ground (m)	4.0	5.0	6.0	7.0	8.0	0.6	10.0	11.0	12.0	13.0	14.0	15.0		
(Fair)	55		- - -		Type	8 ELE YAGI													
· ·	Height (MSL)		· · ·		Polari- ration	н													:
Month Year Nov. 1981	N	ML 538A		Meanted	Field Strength Value (db)	9.2	11.2	10.7	12.7	12.2	14.2	14.7	15.7	16.7	16.7	<i>L'</i> 11	* 18.7		
Week Day (Fn.) 27	Measured at CARMEN				Transmitting Station	IBA			-										
Dete:	Measure	Instrument			Ţ	09:40											09:45		

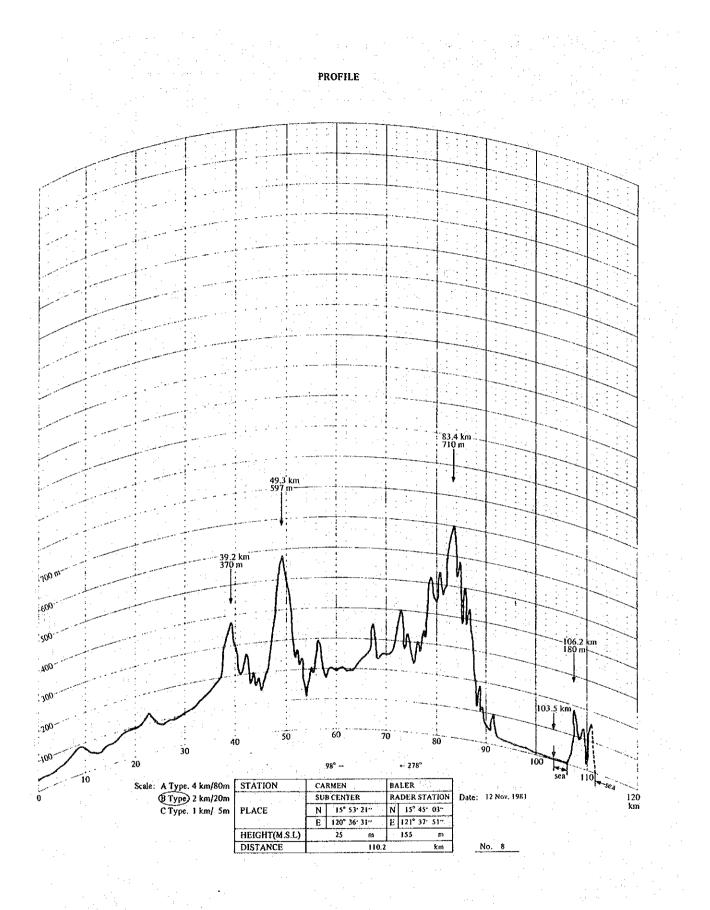


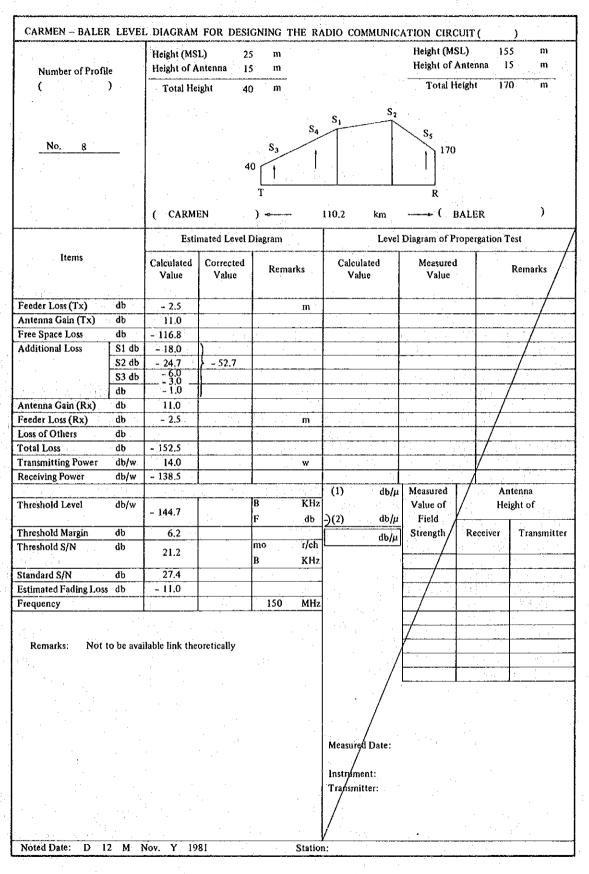












APPENDIX IV

RESULT OF THE SITE SURVEY FOR RADIO STATIONS

CONTENTS

:		Page
Result of the	site survey on the;	. : -
1.	DUCAN (APARRI RADAR)	4
2.	APARRI	8
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4.	CARMEN ROSALES (N.F.F.S SUB-CENTER)	17
5.	IBA	24
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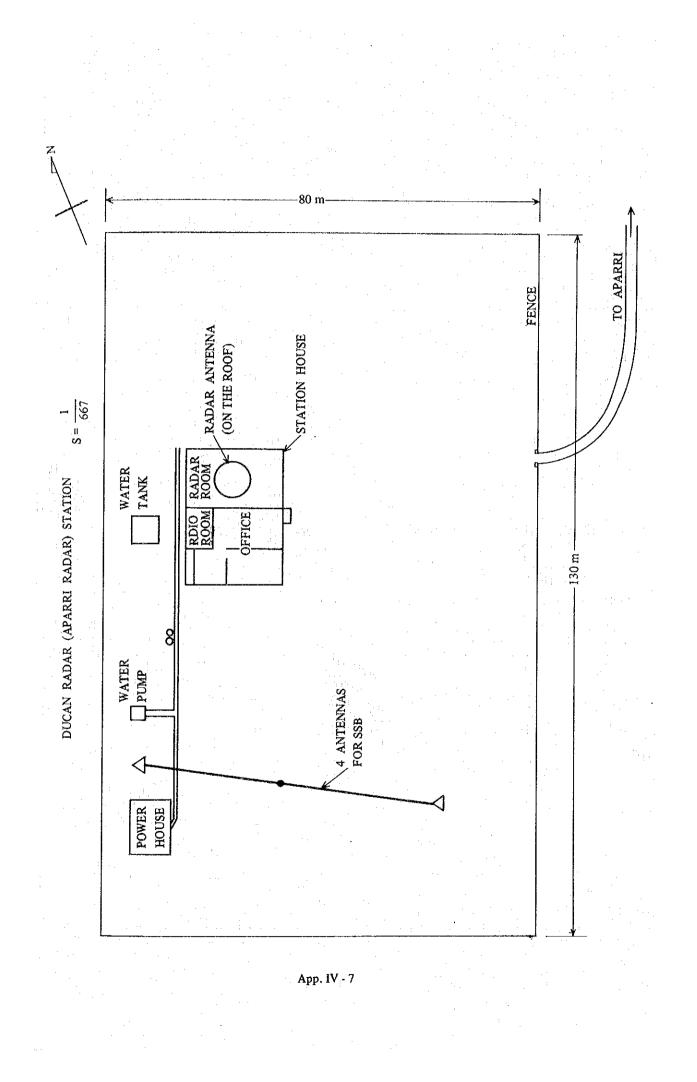
	4 		ltem	Judge- ment	Remarks
1.	Picture of	1-1	Span Distances and Above the Sca Level		15 KM to APARRI 30 M
	Route	1-2	Relative Figure of Established Radio Circuit		none (HF SSB station and radar station are existing)
		1-3	Outline of Direction Angle		90° for APARRI
2.	Place of	2-1	Established Station or New		The new 150 MHZ VHF link will be established
	Candidacy	2-2	Geology		gentle hilly terrain clayey
		2-3	Latitude and Longitude		18° 22' N 121° 37' E
		2-4	Above the Sea Level		30M
	· - -	2-5	Direction Angle		90° for APARRI
		2-6	Area of Site (Estimate)		Approximately 1 HA
		2-7	Owner (Private, Government- owned or public)		Government owned
		2-8	Topography and Geology etc (Outline)		gentle hilly terrain, clayey
		2-9	Take-able Point of Water for Construction		available near the site
		2-10	Others		
3.	Road	3-1	Present of Road (Path and Driveway)		partly rough road
		3-2	Length of the New Road Needed (km)		none

Table of Survey Items for Radio Station (Field Survey) 1.

	· ·				
		:	· · ·		
		:			
			Item	Judge- ment	Remarks
		3-3	Length of Road to be repaired (km)	i	none
	:	3-4	Figure of Outline (include Established Road)		see the FIG attached
 .	Tower	4-1	Established or New Establish	· · · · · · · · · · · · · · · · · · ·	a 10 mH tower will be needed for the new 150MHZ VHF link
		4-2	Antenna Height from the Ground, or the roof	· ·	approximately 10 mH will be needed
		4-3	Need of Radome		none (established for RADAR antenna)
	•	4-4	Propriety of Antenna-Load		will be designed as the occasion demands
5.	Power Supply,	5-1	Length of Exclusive New Power Line (km)		none
	Electric Power Line	5-2	Obstructive Condition of Commercial Power		cut off more than several times a month for 1 to 2 hours a time on an average.
		5-3	Present State of Used Power in the Established Station	-	220V, 1Ø, 60 HZ (220V, 1Ø, 35 KVA 60HZ E.G. is existing)
). .	Station House	6-1	Necessity of New, Extension and Established etc.		nòne
		6-2	Figure of Present Outline of Established House		see the FIG. attached
	Propa-	7-1	Profile		no need
	gation Path of Relations	7-2	Testing of Line of Sight		line of sight
	Relations	7-3	Outline of Topography aroun Reflection Points	đ	
		7-4	Outline of Topography near the Station		gentle hilly
		7-5	Kinds of Propagation Path Models		free space propagation
	· · ·			App. IV	- 5

		:		· ·	
		:	Item	Judge- ment	Remarks
8.	Vechiles	8-1	Necessity of Particular Cars		none
		8-2	Necessity of Car Sheds		none
9.	Mainte- nance	9-1	Minimum time for Mainte- nance		approximately 4 hours from TUGUEGARAO
	Informa- tion Figure of Road to the Sta- tion	10-1	Map around Place of Candi- dacy		see the FIG attached
		10-2	Map of Road to the Station		ditto
-		10-3	Direction of Neighbouring Stations Established		none
11.	Others	11-1	Amount of Rainfall in a Year		approximately 2250 mm
		11-2	Means of Wind-Speed and Main Wind Direction	n	NE/06 KNOTS
		11-3	Poisonous Gas		none
		11-4	Harmful Establishments		none
		11-5	Kinds of Near Radio Station Systems		none
			Communication Traffic of Relative Area		none
		11-7	Condition of Traffic		generally good
		11-8	Present Public Order		peaceful
		11-9	Others		

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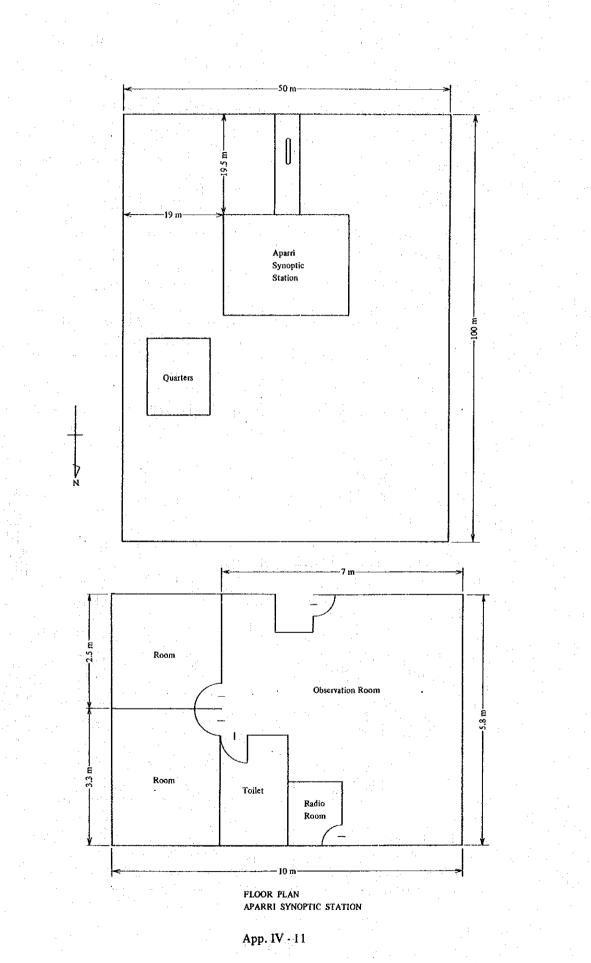
			Item	Judge- ment	Remarks
1.	Figure of	1-1	Span Distance and Above the Sea Level		79.4 KM to TUGUEGARAO 2M
: - -	Route	1-2	Relative Figure of Establish- ed Radio Circuit		none (a HF SSB station is existing)
•		1-3	Outline of Direction Angle		350° for TUGUEGARAO
2.	Place of Candidacy	2-1	Established Station or New		The new 150MHZ VHF link for DUCAN (APARRI RADAR) & TUGUEGARAO will be established
		2-2	Geology		plan terrain near the sea shore, sandy
		2-3	Latitude and Longitude		18° 21' 43''N 121° 37' 45''E
		2-4	Above the Sea Level		2M
		2-5	Direction Angle		350° for TUGUEGARAO
		2-6	Area of Site (Estimate)		approximately 1 HA
•	· · · · ·	2-7	Owner (Private, Government- owned or public)		government owned
		2-8	Topography and Geology etc (Outline)		plane terrain near the sea shore, sandy
		2-9	Take-able Point of Water for Construction		available near the site
		2-10	Others		
3.	Road	3-1	Present of Road		good

Table of Survey Items for Radio Station (Field Survey) 2.

			Item	Judge- ment	Remarks
		3-2	Length of the New Road Needed (km)		none
•		3-3	Length of Road to be repaired (km)	· · · · ·	none
		3-4	Figure of Outline (include Established Road)		see the FIG attached
4.	Tower	4-1	Established or New Establish		Two 20 mH towers will be needed for the new 150 MHZ VHF link.
	·	4-2	Antenna Height from the Ground, or the roof		more than 15 mH will be needed
		4-3	Need of Radome		none
		4-4	Propriety of Antenna-Load		will be designed as the occasion demands
5.	Power Supply,	5-1	Length of Exclusive New Power Line (km)		none
-	Electric Power Line	5-2	Obstructive Condition of Commercial Power		cut off more than several times a month, for 1 to 2 hours a time on an average.
		5-3	Present State of Used Power in the Established Station		220V, 10 fluctuating voltage A.V.R. is needed
6.	Station House	6-1	Necessity of New, Extension and Established etc.		none
		6-2	Figure of Present Outline of Established House		see the FIG attached
	Propa- gation	7-1	Profile	-	see the profile for the new link TUGUEGARAC
	Path of Relations	7-2	Testing of Line of Sight		none mountain diffraction path to TUGUEGARAO
	- - -	7-3	Outline of Topography around Reflection Points		

			Item	Judge- ment	Remarks
	· · · ·	7-4	Outline of Topograph near the Station		plane terrain near the seashore
	• • •	7-5	Kinds of Propagation Path Models		mountain diffraction path. see the profile for TUGUEGARAO-APARRI
8.	Vehicles	8-1	Necessity of Particular Cars	.:	none
		8-2	Necessity of Car Sheds		none
9.	Mainte- nance	9-1	Minimum time for Mainte- nance		approximately 3 hours from TUGUEGARAO
10.	Informa- tion	10-1	Map around Place of Candi- dacy		see the FIG attached
	Figure of Road to	10-2	Map of Road to the Station		see the FIG attached
	the Sta- tion	10-3	Direction of Neighbouring Stations Established		none
11.	Others	11-1	Amount of Rainfall in a Year		2251.3 mm
		11-2	Means of Wind-Speed and Main Wind Direction		NE/6 KNOTS
		11-3	Poisonous Gas		none
•		114	Harmful Establishments		none
		11-5	Kinds of Near Radio Station Systems		none
÷		11-6	Communication Traffic of Relative Area		none
:		11-7	Condition of Traffic		good
		11-8	Present Public Order		peaceful
		11-9	Others	. [

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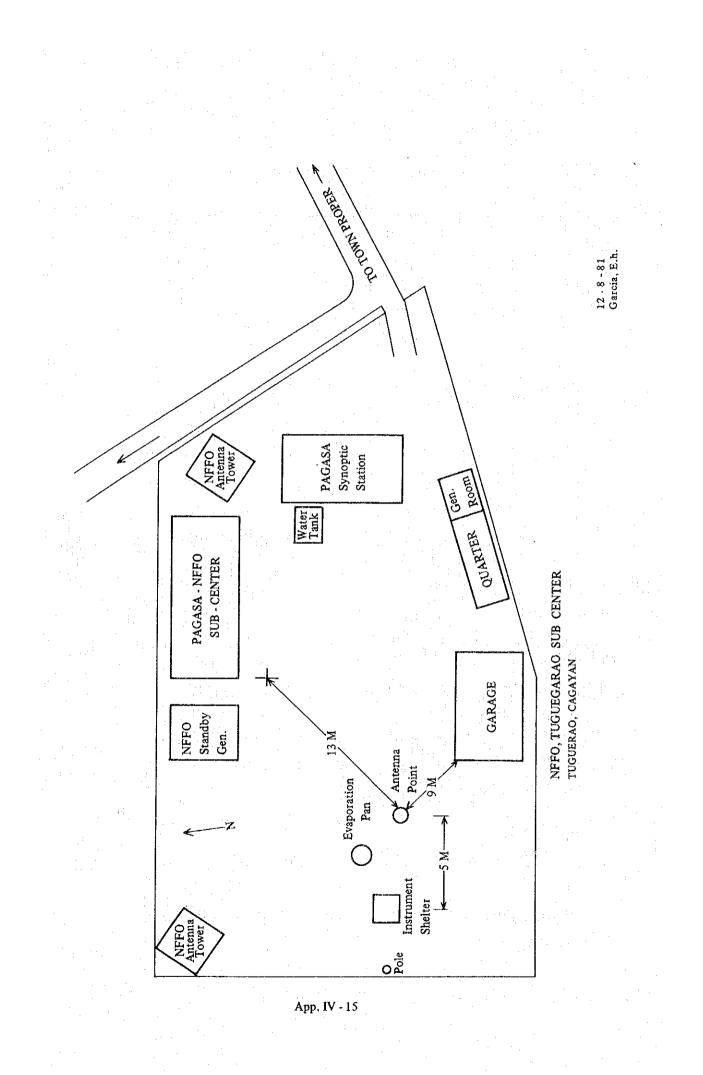


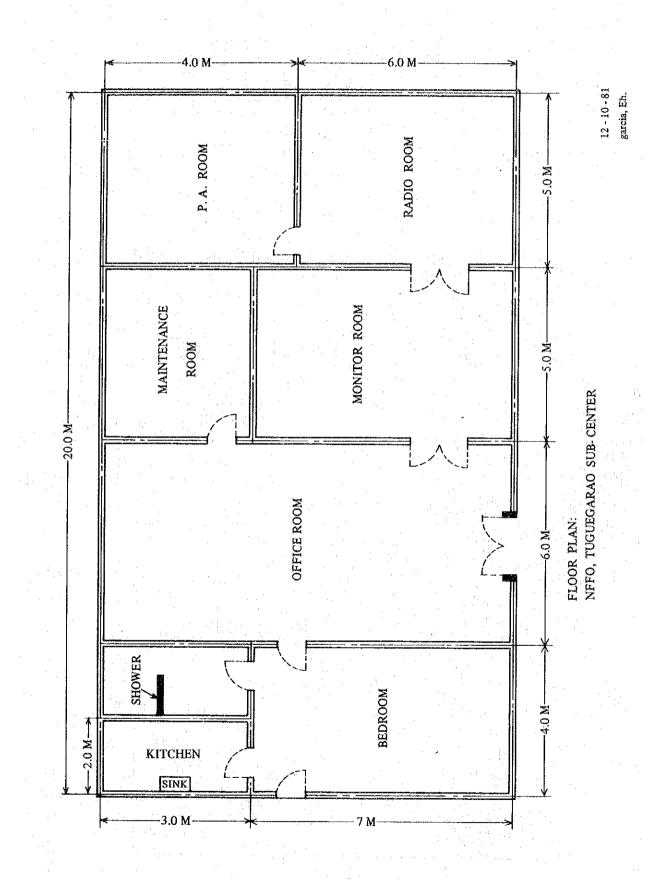
	Station:	TUGL	JEGARAO	Survey	DIS: Date 30 October 81
			Item	Judge- ment	Remarks
1.	Picture of Route	1-1	Span Distance and Above the Sea Level		79.4 KM to APARRI
·		1-2	Relative Figure of Established Radio Circuit		the new 150MHZ VHF link will be connected with existing F.F.S (F.F.S. 400MHZ TROPOSCATTER for CAR MEN ROSALES is existing)
		1-3	Outline of Direction Angle		355° for APARRI
2.	Place of Candidacy	2-1	Established Station or New		The new 150MHZ VHF link will be established (F.F.S on 400 MHZ & 150 MHZ is existing
	oundidudy	2-2	Geology		slightly rocky
		2-3	Latitude and Longitude		17° 38' 53" N 121° 45' 34"E
		2-4	Above the Sea Level		61M
	•	2-5	Direction Angle		355°for APARRI
		2-6	Area of Site (Estimate)	· .	Approximately 0.4 HZ
		2-7	Owner (Private, Government owned or Public)		Government-owned
		2-8	Topography and Geology etc. (Outline)		gentle hilly terrain, slightly rocky
		2-9	Take-able Point of Water for Construction		available at near the station
		2-10	Others		Ranked as the F.F.S SUB SENTER
•	Road	3-1	Present of Road (Path and Driveway)	8-	good condition

Table of Survey Items for Radio Station (Field Survey) 3.

		Item	Judge- ment	Remarks
	3-2	Length of the New Road Needed (km)		none
	3-3	Length of Road to be repaired (km)	-	nonė
	3-4	Figure of Outline (include Established Road)		see the FIG attached
4. Tower	4-1	Established or New Establish		The two 35M height towers are existing for FFS
	4-2	Antenna Height from the Ground, or the roof		The three 6M \emptyset G.P. are existing The part less than 30M of the towers are avail- able for the new 150 MHZ link
	4-3	Need of Radome		none
	4-4	Propriety of Antenna-Load		possible for YAGI antenna
5. Power Supply, Electric	5-1	Length of Exclusive New Power Line (km)		none
Power Line		Obstructive Condition of Commercial Power		cut off more than several times a month, for 2 hours a time on an average.
	1	Present State of Used Power in the Established Station		F.F.S on the 400MHZ 1KW TROPOSCATTER for CARMEN ROSALES will be operated in the near future. 220V 3Ø
				220 V 1Ø (220V 30KVA 3Ø dual stand-by E.G. is ex- isting)
. Station House	1	Necessity of New, Extension and Established etc.		The established for F.F.S is available
		Figure of Present Outline of Established House		see the FIG attached
. Propa- gation Path of	7-1]	Profile		see the profile for the new link TUGUEGARAO- APARRI
Relations	7-2	Festing of Line of Sight		none mountain diffraction path to APARRI

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	·		÷ .	
	Iterre		To day	Panauka
	Item		Judge- ment	Remarks
· .		ne of Topography ad Reflection Points		
а на		ne of Topography he Station		gentle hilly terrain
	7-5 Kinds Mode	s of Propagation Path Is		mountain diffraction path, see the profile fo TUGUEGARAO-APARRI
8. Vehicles	8-1 Neces	ssity of Particular Cars		none
	8-2 Neces	sity of Car Sheds		none
9. Mainte- nance	9-1 Minin nance	num time for Mainte-		none
10. Informa- tion	10-1 Map a Cand	around Place of idacy		see the FIG. attached
Figure of Road to the Sta-	10-2 Map	of Road to the Station		ditto
tion		tion of Neighbouring ons Established		none
11. Others	11-1 Ато	int of Rainfall in a Year		1715.7 mm
		s of Wind-Speed and Wind Direction		N/3 KNOTS
	11-3 Poiso	nous Gas		none
	11-4 Harm	ful Establishments		none
	11-5 Kinds Syste	s of Near Radio Station ms		F.F.S 400MHZ 1KW SS-PM 5/6 CH TROPOSCATTER for CARMEN ROSALE is in the site.
		nunication Traffic of ive Area		2 CHS out of F.F.S are available for the new 150MHZ VHF link
	11-7 Cond	ition of Traffic		smooth
	11-8 Prese	nt Public Order		peaceful
	11-9 other	S		





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Table of Survey Items for Radio Station (Field Survey) 4.

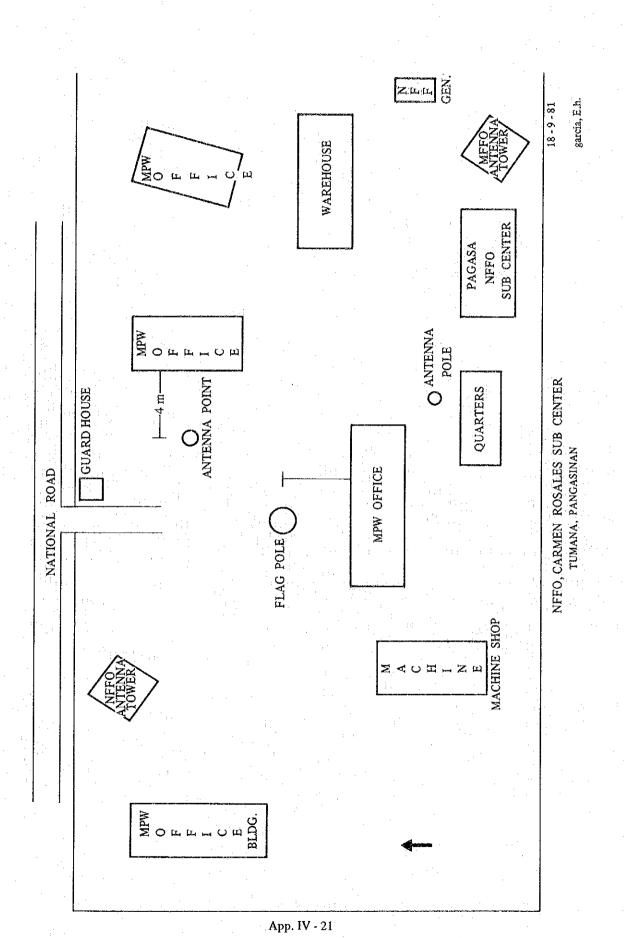
	<u> </u>		Item	Judge- ment	Remarks
1.	Picture of Route	1-1	Span Distance and Above the Sea Level		96.5 KM to IBA. 38 Km to DAGUPAN, 58 KM to BAGUIO 41 Km to MUÑOS 25 M
		1-2	Relative Figure of Established Radio Circuit		The new 150MHZ VHF link will be connected with existing F.F.S F.F.S 800 MHZ for SCIENCE GARDEN & 400 MHZ for TUGUEGARAO are existing
		1-3	Outline of Direction Angle		227° for IBA, 316° for DAGUPAN 5° for BAGUIO, 122° for MUÑOS
•	Place of	2-1	Established Station or New		The new 150MHZ VHF link will be established (F.F.S on 800 MHZ & 400 MHZ is existing)
	Candidacy	2-2	Geology		plane terrain, clayey
		2-3	Latitude and Longitude		15° 53' 21'' N 120° 36' 31'' E
		2-4	Above the Sea Level		25 m
		2-5	Direction Angle		see the Item 1-3
		2-6	Area of Site (Estimate)	;	approximately 0.8HA including M.P.W.
÷		2-7	Owner (Private, Government owned or public)		government owned
		2-8	Topography and Geology etc. (Outline)		plane terrain, clayey
		2-9	Take-able Point of Water for Construction		available in the site
		2-10	Others		ranked as the F.F.S SUB CENTER
•	Road	3-1	Present of Road (Path and Driveway)		good

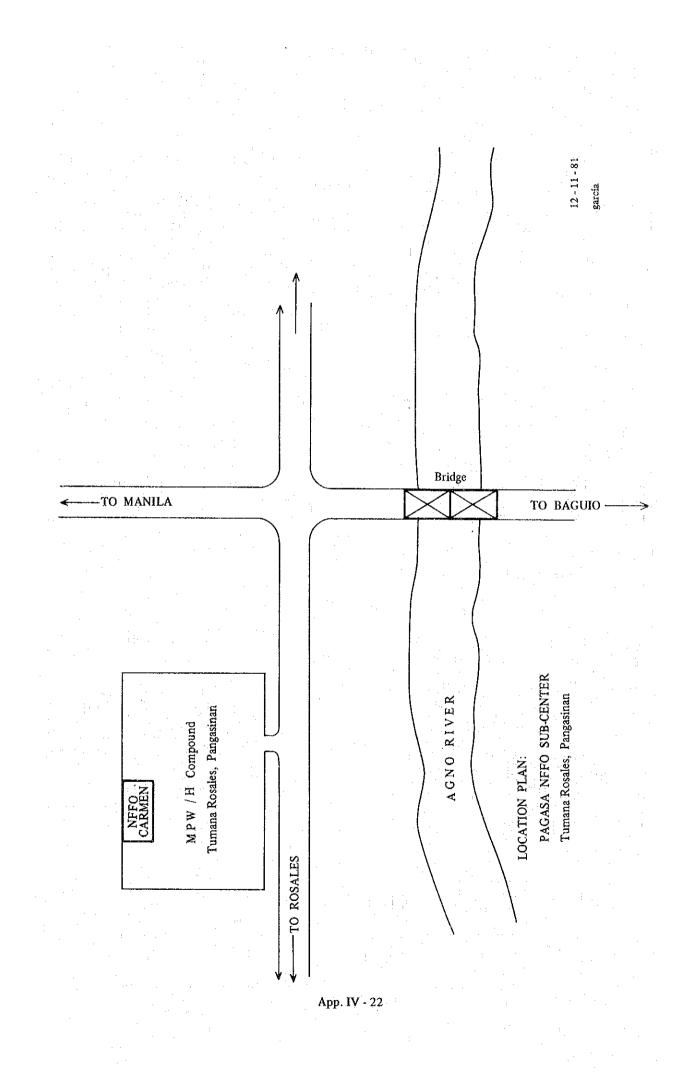
	Item	Judge- ment	Remarks
	3-2 Length of the New Road Needed (km)		none
	3-3 Length of Road to be repaired (km)		none
	3-4 Figure of Outline (include Established Road)		see the FIG attached
4. Tower	4-1 Established or New Establish		a 25m H tower & a .35m H tower are existing
	4-2 Antenna Height from the Ground, or the roof		a 10m \emptyset G.P. & three 6m \emptyset G.P. are existing The part less than 20m of each tower is avail able
	4-3 Need of Radome		none
ء مربع <u>1997 - مربع مر</u>	4-4 Propriety of Antenna-Load		possible for YAGI type antenna
5. Power Supply, Electric	5-1 Length of Exclusive New Power Line (km)		none
Power Line	5-2 Obstructive Condition of Commercial Power		cut off more than several times a month for 1 to 2 hours a time on an average.
	5-3 Present State of Used Power in the Established Station		F.F.S on the 400 MHZ 1KW TROPOSCATTER for TUGUEGARAO will be operated in near future. 220V, 3Ø, 60HZ (220V, 40KVA, 3Ø 60HZ E.G. for F.F.S is existing)
. Station House	6-1 Necessity of New, Extension and Established etc.		none
	6-2 Figure of Present Outline of Established House		see the FIG attached
Propa- gation	7-1 Profile		see the profile for the new link CARMEN-IBA
Path of Relations	7-2 Testing of Line of Sight		none mountain diffraction path to IBA

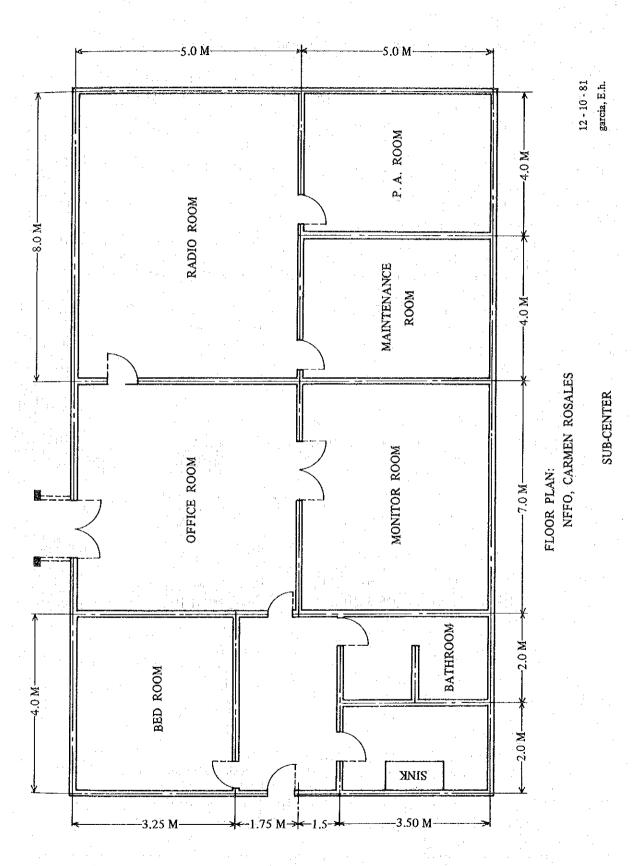
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		Item	Judge- ment	Remarks
	7-3	Outline of Topography around Reflection Points		
	7-4	Outline of Topography near the Station		plane terrain
	7-5	Kinds of Propagation Path Models		mountain diffraction path see the profile for CARMEN ROSALES-IBA
8. Vehicles	8-1	Necessity of Particular Cars		none
	8-2	Necessity of Car Sheds		none
9. Mainte- nance	9-1	Minimum time for Mainte- nance		none
10. Informa- tion	10-1	Map around Place of Candidacy		see the FIG attached
Figure of Road to the Sta-	10-2	Map of Road to the Station		ditto
tion	10-3	Direction of Neighbouring Stations Established		none
11. Others	11-1	Amount of Rainfall in a Year		
	11-2	Means of Wind-Speed and Main Wind Direction		
	11-3	Poisonous Gas		none
	11-4	Harmful Establishments		none
	11-5	Kinds of Near Radio Station		F.F.S 400 MHZ, 1KW, SS-PM, 5/6 CH, TROPOSCATTER for TUGUEGARAO & 800 MHZ, 70 W, SS-PM, 11/12 CH TROPOSCAT-
				TER for SCIENCE GARDEN are in the site
	11-6	Communication Traffic of Relative Area		2 ch on 400 MHZ for TUGUEGARAO & 2 CH on 800 MHZ for SCIENCE GARDEN out of F.F.S. are available for the new 150MHZ VHF

	Item	Judge- ment	Remarks			
19	11-7 Condition of Traffic		good			
	11-8 Present Public Order	· · · :	peaceful			
	11-9 Others	1		 		

11-9 Others







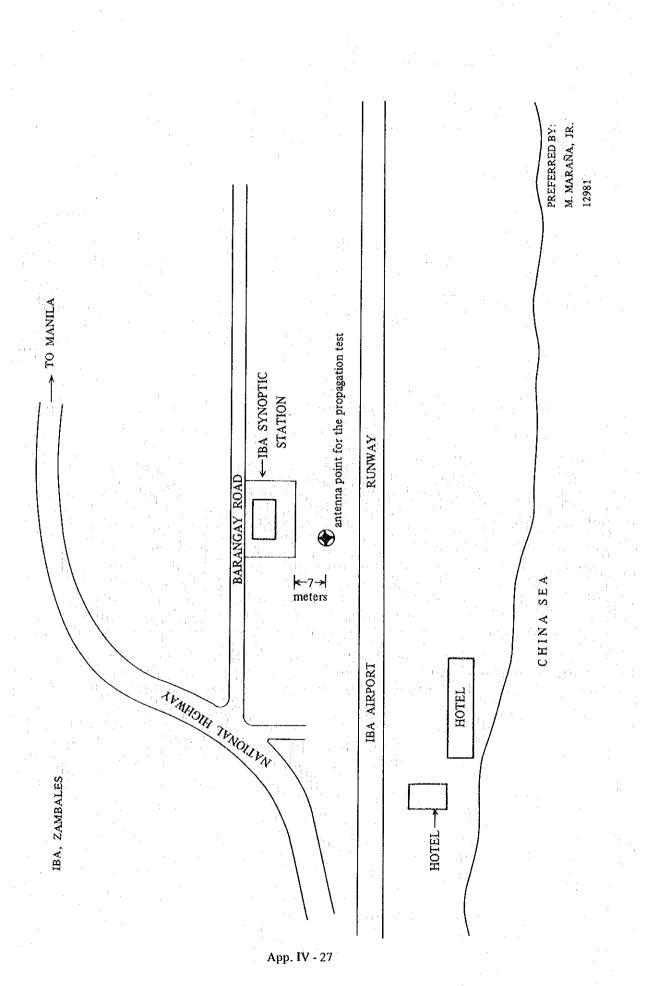
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				Judge- ment	Remarks
	Picture of Route	1-1	Span Distance and Above the Sea Level		96.5 KM to CARMEN ROSALES 4M
•	Koute	1-2	Relative Figure of Established Radio Circuit		none (a HF SSB station is existing)
		1-3	Outline of Direction Angle		47° for CARMEN ROSALES
:	Place of	2-1	Established Station or New		The new 150 MHZ VHF link for CARMEN ROSALES will be established
:	Candidacy	2-2	Geology		flat terrain sandy
		2-3	Latitude and Longitude		15° 20' N 119° 58' E
		2-4	Above the Sea Level		4 M
		2-5	Direction Angle		47° for CARMEN ROSALES
		2.6	Area of Site (Estimate)		50M × 25M
	-	2-7	Owner (Private, Government owned or public)		government owned
		2-8	Topography and Geology etc (Outline)		flat terrain sandy
• .		2-9	Take-able Point of Water for Construction		available
		2-10	Others		
3.	Road	3-1	Present of Road (Path and Driveway)		dirt road needs improvement
		3-2	Length of the New Road Needed (km)		none

Table of Survey Items for Radio Station (Field Survey) 5.

		Item	Judge- ment	Remarks
	3-3	Length of Road to be repaired (km)		500 m
	3-4	Figure of Outline (include Established Road)		see the FIG attached
4. Tower	4-1	Established or New Establish		a 20 mH tower will be needed for the new 150 MHZ VHF link
	4-2	Antenna Height from the Ground, or the roof		more than 15 mH will be needed
	4-3	Need of Radome		none
1 * :	4-4	Propriety of Antenna-Load		will be designed as the occasion demands
5. Power Supply, Electric	5-1	Length of Exclusive New Power Line (km)		none
Power Line	5-2	Obstructive Condition of Commercial Power		brown out sometimes
	5-3	Present State of Used Power in the Established Station		220V, 1Ø 60 HZ fluctuating voltage AVR is needed
6. Station House	6-1	Necessity of New, Extension and Established etc.	-	none
	6-2	Figure of Present Outline of Established House		see the FIG attached
7. Propa- gation Path of	7-1	Profile		see the profile for the new link CARMEN ROSALES-IBA
Relations	7-2	Testing of Line of Sight		none mountain diffraction path to CARMEN ROSALES
	7-3	Outline of Topography around Reflection Points	:	
	7-4	Outline of Topography near the Station		flat terrain near the seashore, sandy
		Арј	p. IV - 2	5
		· · · · · · · · · · · · · · · · · · ·		

			Item	Judge- ment	Remarks
	-	7-5	Kinds of Propagation Path Models		mountain diffraction path
8.	Vehicles	8-1	Necessity of Particular Cars		noné
	·	8-2	Necessity of Car Sheds	a.	none
9.	Mainte- nance	9-1	Minimum time for Mainte- nance		approximately 4 hours from PAGASA or CAR- MEN ROSALES
10.	Informa- tion	10-1	Map around Place of Candidacy		see the FIG attached
	Figure of Road to	10-2	Map of Road to the Station		ditto
	the Sta- tion	10-3	Direction of Neighbouring Stations Established		none
	Others	11-1	Amount of Rainfall in a Yea	I	3672.2 mm
		11-2	Means of Wind-Speed and Main Wind Direction		W/4 KNOTS
		11-3	Poisonous Gas		none
		11-4	Harmful Establishments		none
		11-5	Kinds of Near Radio Station Systems		none
		11-6	Communication Traffic of Relative Area		none
	· ·	11-7	Condition of Traffic		smooth
		11-8	Present Public Order		peaceful
	an An an a	11-9	Others		



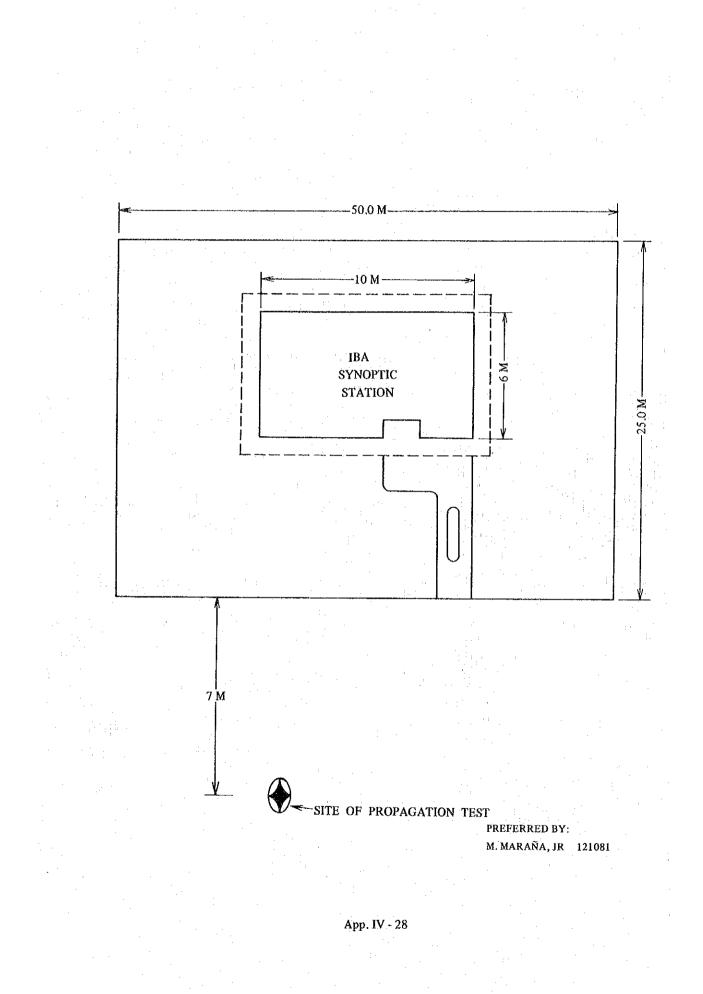


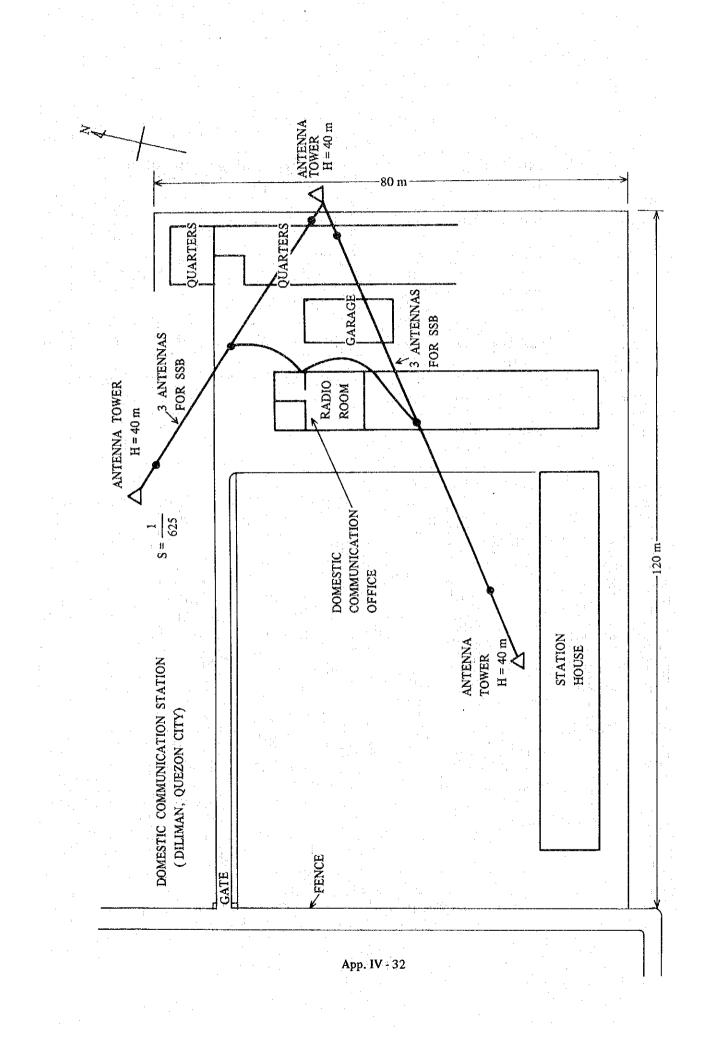
Table of Survey Items for Radio Station (Field Survey) 6.

Station: DILIMAN (QUEZON CITY) Surveyors: Date 9 November 81 (DOMESTIC COMMUNICATION OFFICE) OFFICE)

	Item	Judge- ment	Remarks
1. Picture of	1-1 Span Distance and Above the Sea Level		line of sight to PAGASA CENTRAL OFFICE 48 M
Route	1-2 Relative Figure of Established Radio Circuit		The new Communication Sub Center for VISAYAS and MINDANAO will be established in the near future
	1-3 Outline of Direction Angle		170° for CEBU
2. Place of	2-1 Established Station or New		The new OH station for Cebu will be established in the near future
Candidacy	2-2 Geology		plane terrain ordinary soil
	2-3 Latitude and Longitude		
	2-4 Above the Sea Level		48M
	2-5 Direction Angle		170° for CEBU
	2-6 Area of Site (Estimate)		120m X 80m
	2-7 Owner (Private, Government owned or public)		Government owned
	2-8 Topography and Geology etc (Outline)	•	plane terrain, ordinary soil
	2-9 Take-able Point of Water for Construction		available
	2-10 Others		
3. Road	3-1 Present of Road (Path and Driveway)		good

		•			
÷			İtem	Judge- ment	Remarks
		3-2	Length of the New Road Needed (km)		none
•		3-3	Length of Road to be repaired (km)		none
•		3-4	Figure of Outline (include Established Road)		
•	4. Tower	4-1	Established or New Establish		Two 35 mH towers will be needed
		4-2	Antenna Height from the Ground, or the roof		more than 35 mH will be needed
		4-3	Need of Radome		none
		4-4	Propriety of Antenna-Load	•	will be designed as the occasion demands
	5. Power Supply,	5-1	Length of Exclusive New Power Line (km)		попе
	Electric Power Line	5-2	Obstructive Condition of Commercial Power		stable
		5-3	Present State of Used Power in the Established Station		220V 1Ø 60HZ stable
	6. Station House	.6-1	Necessity of New, Extension and Established etc.		The new station house including E.G. will b needed
		6-2	Figure of Present Outline of Established House		see the FIG attached
	7. Propa-	7-1	Profile		none
	gation Path of Polations	7-2	Testing of Line of Sight		none
	Relations	7-3	Outline of Topography around Reflection Points		
		7-4	Outline of Topography near the Station		plane terrain ordinary soil
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	· · · · · · · · · · · · · · · · · · ·	Item	Judge- ment	Remarks
	7-5	Kinds of Propagation Path Models	1	Tropospheric scattering propagation path
8. Vehicles	8-1	Necessity of Particular Cars		none
:	8-2	Necessity of Car Sheds		none
9. Mainte- nance	9-1	Minimum time for Mainte- nance		none
10. Informa- tion	10-1	Map around Place of Candidacy		see the FIG attached
Figure of Road to the Sta-	- ·	Map of Road to the Station		
tion	10-3	Direction of Neighbouring Stations Established	- 	
1. Others	11-1	Amount of Rainfall in a Year		
	11-2	Means of Wind-Speed and Main Wind Direction		
	11-3	Poisonous Gas		none
	11-4	Harmful Establishments		none
	11-5	Kinds of Near Radio Station Systems		none
	11-6	Communication Traffic of Relative Area		none
	11-7	Condition of Traffic		good
	11-8	Present Public Order		peaceful
	11-9	Others		
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n an sa	anda Silan Silan	and a second		(1) A set of the se
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SCIENCEGARDEN Date 3 November 81 Surveyors: Station: (QUEZON CITY) Judge-Item Remarks ment 1-1 Span Distance and Above line of sight to PAGASA CENTRAL OFFICE 1. Picture 48 M of the Sea Level Route 1-2 **Relative Figure of** The new 800 MHZ multiplex link for PAGASA Established Radio Circuit C.O. will be established and connected with existing F.F.S. (F.F.S 800 MHZ TROPOSCATTER for CAR-MEN ROSALES and 7 GHZ multiplex link for TANAY are existing) 1-3 **Outline of Direction Angle** 246° for PAGASA C.O. 2. Place 2-1 Established Station or New existing station for F.F.S of Candidacy 2-2 Geology plane terrain, ordinary soil PAGASA 14° 38' 31" N 14° 38' 45" N 2-3 Latitude and Longitude 121° 01' 53" E 121° 02' 35" E 48 M 2-4 Above the Sea Level 246° for PAGASA C.O. 2-5 Direction Angle see the FIG attached Area of Site (Estimate) 2-6 2.7Owner (Private, Governmentgovernment owned owned or public) Topography and Geology etc. plane terrain, 2-8 (Outline) ordinary soil 2-9 Take-able Point of Water for available Construction

Table of Survey Items for Radio Station (Field Survey) 7.

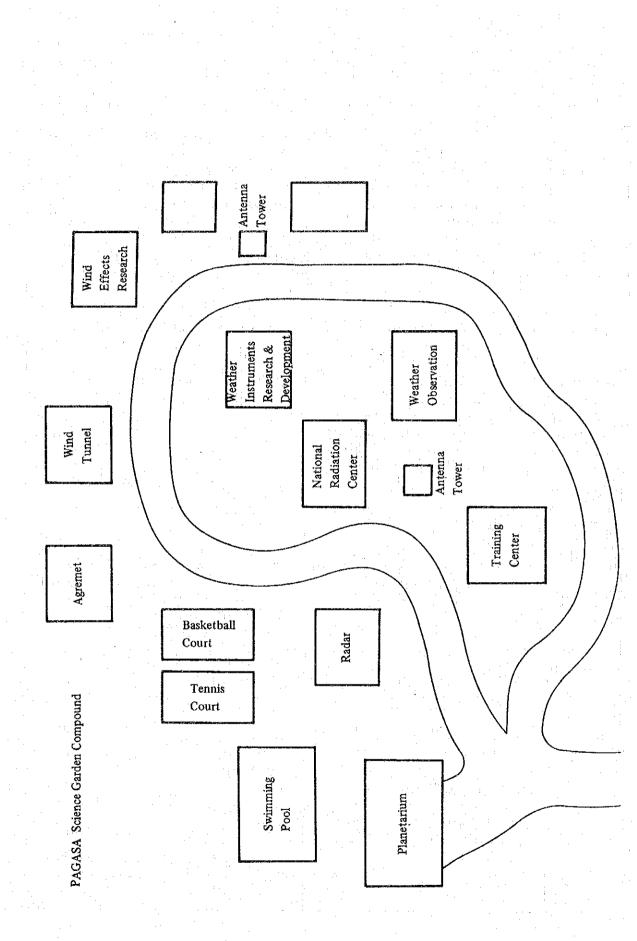
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Others

<u> </u>	and the second secon	ment
3. Road	3-1 Present of Road (Path and Driveway)	good
	3-2 Length of the New Road Needed (km)	none
	3-3 Length of Road to be repaired (km)	none
	3-4 Figure of Outline (include Established Road)	see the FIG. attached
. Tower	4-1 Established or New Establish	established
	4-2 Antenna Height from the Ground, or the roof	less than 20 mH will be needed for 800 MH2 multiplex link for PAGASA C.O.
	4-3 Need of Radome	none
· ·	4-4 Propriety of Antenna-Load	possible for 800 MHZ YAGI type antenn
. Power Supply, Electric	5-1 Length of Exclusive New Power Line (km)	none
Power Line	5-2 Obstructive Condition of Commercial Power	stable
	5-3 Present State of Used Power in the Established Station	220V, 1Ø 60HZ stable
. Station House	6-1 Necessity of New, Extension and Established etc.	none
	6-2 Figure of Present Outline of Established House	see the FIG attached
. Ргора-	7-1 Profile	none (line of sight for PAGASA C.O.)
gation Path of	7-2 Testing of Line of Sight	ditto
Relations	7-3 Outline of Topography around Reflection Points	
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	* .	Item	Judge- ment	Remarks
	7-4	Outline of Topography near the Station		plane terrain ordinary soil
	7-5	Kinds of Propagation Path Models		line of sight propagation path
8. Vehic	les 8-1	Necessity of Particular Cars		none
	8-2	Necessity of Car Sheds		none
9. Maint nance	e- 9-1	Minimum time for Mainte- nance		10 minutes by car from PAGASA C.O.
10. Inform tion		Map around Place of Candidacy		see FIG attached
Figure Road the St	to 10-2	Map of Road to the Station		ditto
tion	a- 10-3	Direction of Neighbouring Stations Established		
11. Other	11-1	Amount of Rainfall in a Year		
· · · ; · · · ·	11-2	Means of Wind-Speed and Main Wind Direction		
	11-3	Poisonous Gas		none
· ·	11-4	Harmful Establishments		none
*	11-5	Kinds of Near Radio Station Sysmtes		
	11-6	Communication Traffic of Relative Area		unknown
-	11-7	Condition of Traffic		smooth
	11-8	Present Public Order		peaceful
	11-9	Others		The new proposed 800 MHZ multiplex link for PAGASA C.O. will be connected with existing FFS at NFFC



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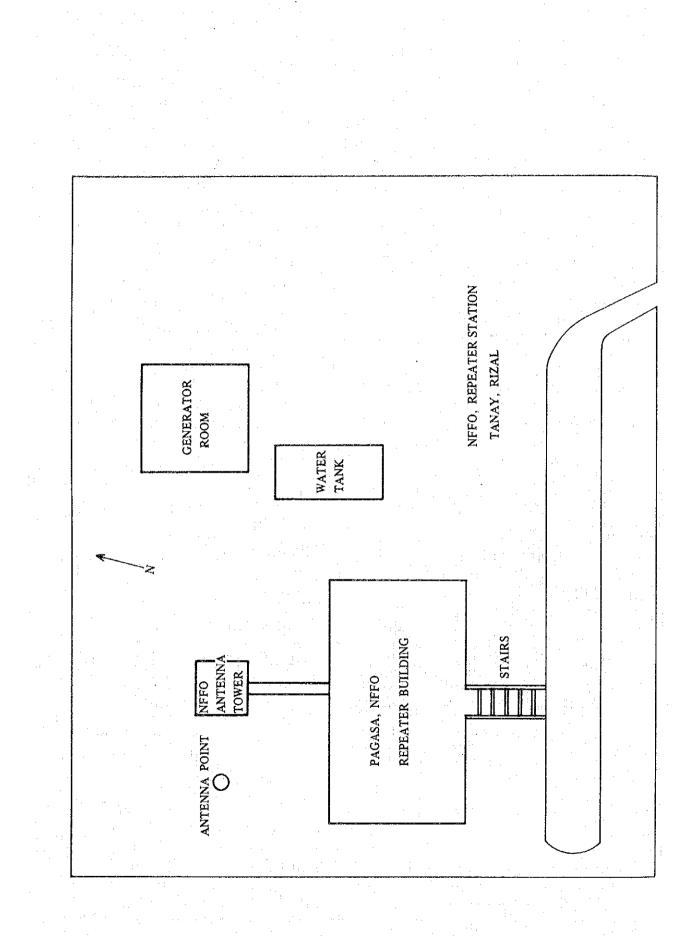
	Station:	TANAY F.F.S. RELAY	Survey	ors: Date 22 November 81
		Item	Judge- ment	Remarks
1.	Picture of	1-1 Span Distance and Above the Sea Level		63.9 Km to TAYABAS 530 M
	Route	1-2 Relative Figure of Established Radio Circuit		The new 150MHZ VHF link will be connected with existing F.F.S. F.F.S 800MHZ for NAGA & 7GHZ for SCI- ENCE GARDEN are existing
		1-3 Outline of Direction Angle		170° for TAYABAS
2.	Place of	2-1 Established Station or New		The new 150 MHZ VHF link will be established (F.F.S, on 800MHZ & 7GHZ are existing)
	Candidacy	2-2 Geology	·	mountainous terrain The existing station is situated on a hill
		2-3 Latitude and Longitude		14° 33' 53" N 121° 21' 07" E
		2-4 Above the Sea Level		530 M
		2-5 Direction Angle		170° for TAYABAS
1 I.		2-6 Area of Site (Estimate)		approximately 600 M ²
		2-7 Owner (Private, Government- owned or public)		owned
		2-8 Topography and Geology etc (Outline)		mountainous terrain clayey
		2-9 Take-able Point of Water for Construction		available near the station
		2-10 Others		
3.	Road	3-1 Present of Road (Path and Driveway)	· · ·	muddy for several KMs when it rains. steap slopes near the site

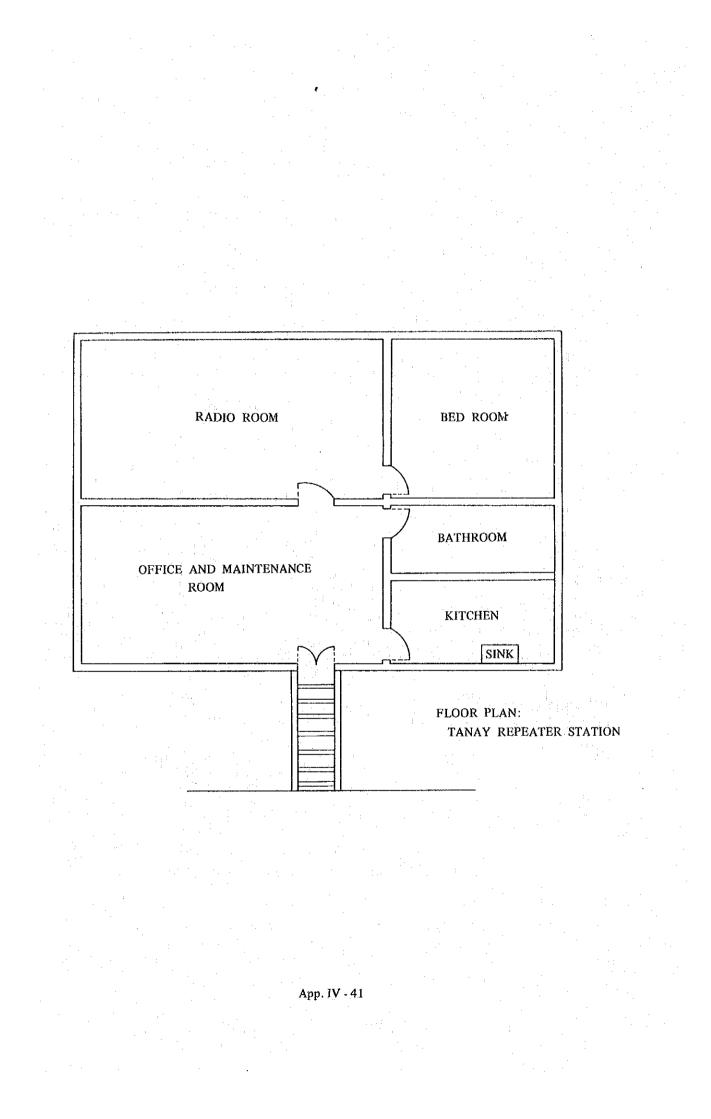
Table of Survey Items for Radio Station (Field Survey) 8.

	· · ·				(1,1,1) , we can see that the set of the
			Item	Judge- ment	Remarks
		3-2	Length of the New Road Needed (km)		none
		3-3	Length of Road to be repaired (km)		none
		3.4	Figure of Outline (include Established Road)		see the FIG attached
4.	Tower	4-1	Established or New Establish		a 20M height tower for F.F.S. is existing
	· · · ·	4-2	Antenna Height from the Ground, or the roof		a 3MØ G.P. are existing The part less than 15 MH of the tower is avail- able
		4-3	Need of Radome		none
		4-4	Propriety of Antenna-Load		possible for YAGI type antenna
5.	Power Supply, Electric	5-1	Length of Exclusive New Power Line (km)		no existing power line at present (a new commercial power line for F.F.S. is planning)
	Power Line	5-2	Obstructive Condition of Commercial Power		unknown
		5-3	Present State of Used Power in the Established Station		unknown (220V, 10KVA, 1Ø 60HZ dual stand-by E.G. for F.F.S. is existing)
6.	Station House	6-1	Necessity of New, Extension and Established etc.		The established for F.F.S. is available
		6-2	Figure of Present Outline of Established House		see the FIG attached
7.	Propa- gation Path of	7-1	Profile		see the profile for the new link TANAY- TAYABAS
	Relations	7-2	Testing of Line of Sight		none mountain diffraction path to TAYABAS
		7-3	Outline of Topography around Reflection Points		

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	Item	Judge- ment	Remarks
	7-4 Outline of Topograph near the Station	y ·	mountainous terrain hilly
	7-5 Kinds of Propagation Path Models		mountain diffraction path see the profile for TANAY-TAYABAS
8. Vehicles	8-1 Necessity of Particula	r Cars	necessary for muddy road
і	8-2 Necessity of Car Shed	s	none
9. Mainte- nance	9-1 Minimum time for Ma nance	iinte-	less than 3 hours from PAGASA C.O.
10. Informa- tion	10-1 Map around Place of Candidacy		see the FIG attached
Figure of Road to	10-2 Map of Road to the S	tation	ditto
the Sta- tion	10-3 Direction of Neighbor Stations Established	iring	none
11. Others	11-1 Amount of Rainfall ir	ı a Year	
	11-2 Means of Wind-Speed Main Wind Direction		
	11-3 Poisonous Gas		none
	11-4 Harmful Establishmer	nts	none
	11-5 Kinds of Near Radio S Systems	Station	F.F.S. 800MHZ 70W SS-PM, 5/6 CH & 7GHZ 1W, SS-PM, 6/12 CH multiplex for NAGA & SCIENCE GARDEN are in the site
· · ·	11-6 Communication Traff Relative Area	ĩc of	2 CH for NAGA and 3 CH for SCIENCE GAR DEN are available for the new 150MHZ VHF link
	11-7 Condition of Traffic		smooth, except for several KMs when it rains
· · ·	11-8 Present Public Order		peaceful
:	11-9 Others		





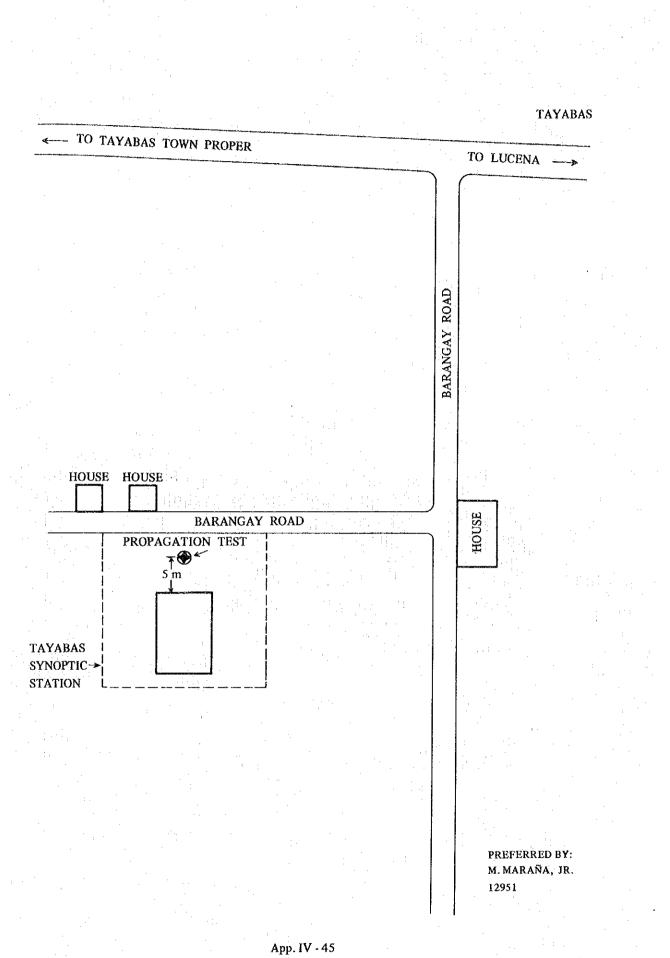
1. I	Station:	TAYABAS	Survey	Date 22 November 81
		Item	Judge- ment	Remarks
1.	Picture of Route	1-1 Span Distance and Above the Sea Level		63.9 KM to TANAY 157 M
	Koua	1-2 Relative Figure of Established Radio Circuit		none (a HF SSB station is existing)
	. 1	1-3 Outline of Direction Angle		345° for TANAY
2.	Place of	2-1 Established Station or New		The new 150 MHZ VHF link for TANAY will be established
	Candidacy	2-2 Geology		rocky soil
		2-3 Latitude and Longitude		14° 02' N 121° 35' E
		2-4 Above the Sea Level		157 M
	ti .	2-5 Direction Angle		345° for TANAY
		2-6 Area of Site (Estimate)		approximately 1 HA
•		2-7 Owner (Private, Governmen owned or public)	t-	Government owned
		2-8 Topography and Geology et (Outline)	C	sloping towards ESE rocky soil
		2-9 Take-able Point of Water for Construction		plenty of water available
		2-10 Others		
3.	Road	3-1 Present of Road (Path and Driveway)		dirt road
		3-2 Length of the New Road Needed (km)		needs improvement

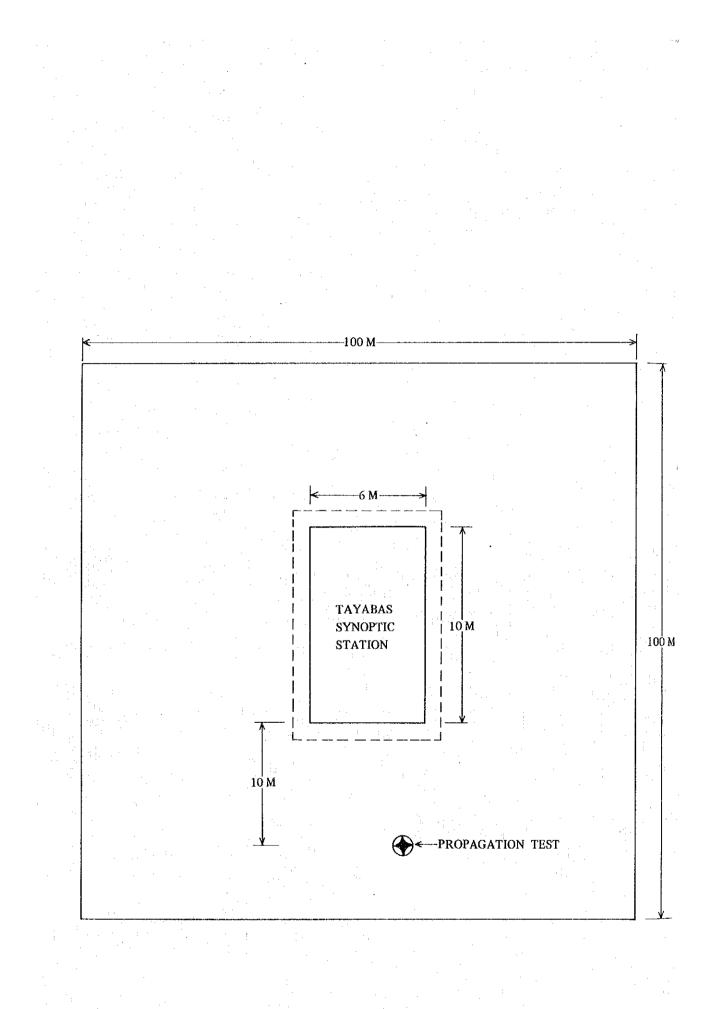
Table of Survey Items for Radio Station (Field Survey) 9.

		Item	Judge- ment	Remarks
	3-3	Length of Road to be repaired (km)		100 M
	3-4	Figure of Outline (include Established Road)		see the FIG attached
4. Tower	4-1	Established or New Establish		a 20 MH tower will be needed for the new 150MHZ VHF link
	4-2	Antenna Height from the Ground, or the roof		more than 15 MH will be needed
	4-3	Need of Radome		none
	4-4	Propriety of Antenna-Load		will be designed as the occasion demands
5. Power Supply,	5-1	Length of Exclusive New Power Line (km)		none
Electric Power Line	5-2	Obstructive Condition of Commercial Power		cut off more than 3 times a month, for 78 hours a month on an average
	5-3	Present State of Used Power in the Established Station		220V, 1Ø, 60 HZ fluctuating voltage A.V.R is needed
6. Station House	6-1	Necessity of New, Extension and Established etc.		none
	6-2	Figure of Present Outline of Established House		see the FIG attached
7. Propa- gation Path of	7-1	Profile		see the profile for the new link-TAYABAS- TANAY
Relations	7-2	Testing of Line of Sight		none mountain diffraction path to TANAY
	7-3	Outline of Topography around Reflection Points		
	74	Outline of Topography near the Station		rocky soil

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		Item	Judge- ment	Remarks
	7-5	Kinds of Propagation Path Models		mountain diffraction path
8. Vehicle	s 8-1	Necessity of Particular Cars		none
	8-2	Necessity of Car Sheds		none
9. Mainte nance	9-1	Minimum time for Mainte- nance		approximately 4 hours from PAGASA
10. Inform tion		Map around Place of Candidacy		see the FIG attached
Figure Road to	10-2	Map of Road to the Station		ditto
the Sta tion	10-3	Direction of Neighbouring Stations Established		none
11. Others	11.1	Amount of Rainfall in a Year	t	2267.8 mm
	11-2	Means of Wind-Speed and Main Wind Direction		NE/5 KNOTS
	11-3	Poisonous Gas	: :	none
	11-4	Harmful Establishments		none
	11-5	Kinds of Near Radio Station Systems		none
a	11-6	Communication Traffic of Relative Area		none
1	11-7	Condition of Traffic		moderate
	11-8	Present Public Order		peaceful
	11-9	Others		······································







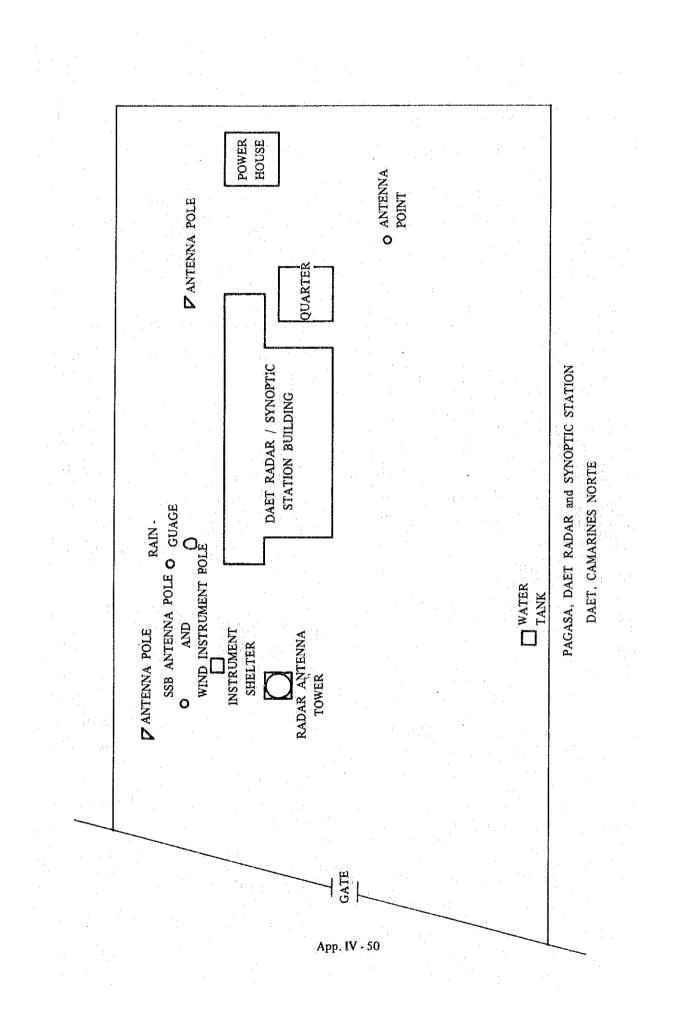
Station:	DAET	(RADAR)	Surveyor	TS: Date 20 November 81
· · · · · · · · · · · · · · · · · · ·		Item	Judge- ment	Remarks
1. Picture of	1-1	Span Distance and Above the Sea Level		59.7 Km to NAGA 2M
Route	1-2	Relative Figure of Established Radio Circuit		none (a H F SSB station and RADAR station are existing)
:	1-3	Outline of Direction Angle		160° for NAGA
2. Place of	2-1	Established Station or New		The new 150 MHZ VHF link for NAGA will be established
Candidacy	2-2	Geology		plan terrain near the seashore clayey
	2-3	Latitude and Longitude		14° 07' 50" N 122° 58' 57" E
e transformer Second	2-4	Above the Sea Level	· .	2M
	2-5	Direction Angle	:	160° for NAGA
	2-6	Area of Site (Estimate)		approximately 3.2 HA
	2-7	Owner (Private, Government owned or public)	-	government owned
	2-8	Topography and Geology etc (Outline)		plane terrain near the seashore clayey
	2-9	Take-able Point of Water for Construction		available in the site
	2-10	Others		
3. Road	3-1	Present of Road (Path and Driveway)		muddy for about 1 KM near the site when it rains

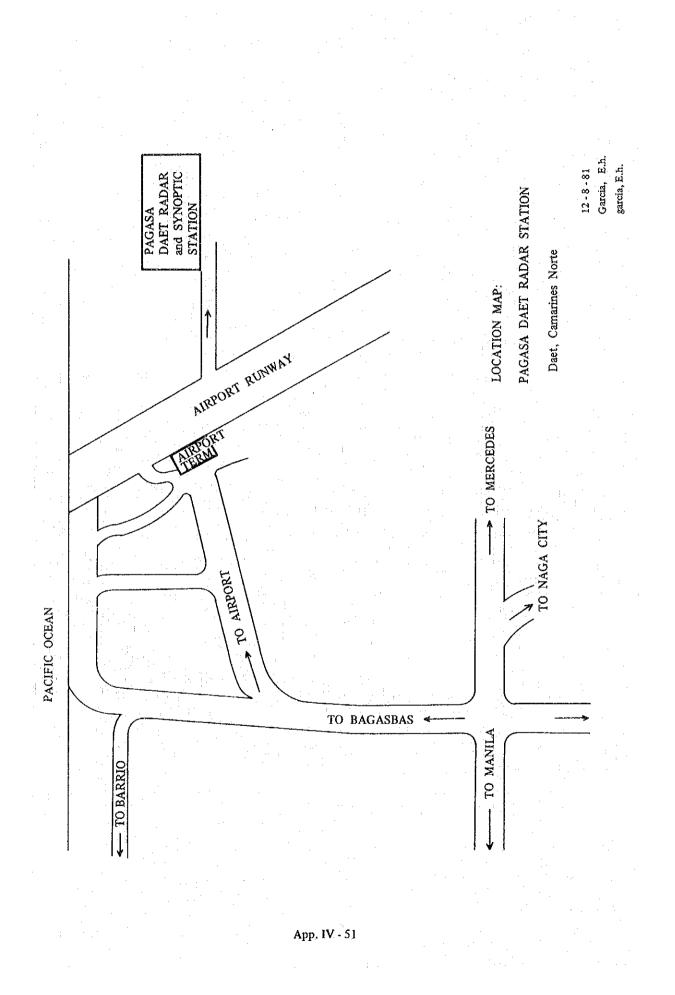
Table of Survey Items for Radio Station (Field Survey) 10.

		Item	Judge- ment	Remarks
	3-2	Length of the New Road Needed (km)		none
	3-3	Length of Road to be repaired (km)		none
	3-4	Figure of Outline (include Established Road)		see the FIG attached
. Tower	4-1	Established or New Establish		a 15 mH tower will be needed for the new 150MHZ VHF link
	4-2	Antenna Height from the Ground, or the roof		more than 15 mH will be needed
	4-3	Need of Radome		none
	4-4	Propriety of Antenna-Load		will be designed as the occasion demands
5. Power Supply,	5-1	Length of Exclusive New Power Line (km)		none
Electric Power Line	5-2	Obstructive Condition of Commercial Power		cut off more than several times a month, for 2 hours a time on an average.
	5-3	Present State of Used Power in the Established Station		220V 1Ø (208/230V, 1Ø, 30 KVA, 60HZ E.G. is ex isting)
5. Station House	6-1	Necessity of New, Extension and Established etc.		none
	6-2	Figure of Present Outline of established House		see the FIG attached
7. Ргора-	7-1	Profile		see the profile for the new link DAET-NAGA
gation Path of Relations	7-2	Testing of Line of Sight		none multi mountain diffraction path for NAGA
	7-3	Outline of Topography around Reflection Points		

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		· · · · · · · · · · · · · · · · · · ·	<u>.</u>	
		Item	Judge- ment	Remarks
	7-4	Outline of Topography		plane terrain near the seashore
:::	·	near the Station		
	7-5	Kinds of Propagation		multi mountain diffraction path
	1-5	Path Models		see the profile for DAET-NAGA
				• · · · · · · · · · · · · · · · · · · ·
8. Vehicles	8-1	Necessity of Particular Cars		none
	8-2	Necessity of Car Sheds		none
9. Mainte-	9-1	Minimum time for Mainte-		approximately 2 hours from NAGA
nance		nance		
10. Informa-	10-1	Map around Place of		see the FIG attached
tion		Candidacy		
Figure of			<u> </u>	
Road to the Sta-	10-2	Map of Road to the Station		see the FIG attached
tion	10-3	Direction of Neighbouring		none
$\frac{1}{2} \left\{ \begin{array}{ccc} -a_{1} & \cdots & a_{n} \\ -a_{n} & -a_{n}^{2} \end{array} \right\}$		Stations Established		
	11-1	Amount of Rainfall in a Year		3599.4 mm
11. Others	11-1			5399.4 1010
	11-2	Means of Wind-Speed and	:	NE/4 KNOTS
		Main Wind Direction		
	11-3	Poisonous Gas		none
	11-4	Harmful Establishments		none
	11.5	Kinds of Near Radio Station		none
	11-5	Systems		
	11-6	Communication Traffic of		noné
	··· . ···	Relative Area		
	11-7	Condition of Traffic		generally good
	11.0	D		peaceful
	11-8	Present Public Order		peaceiui
	11-9	Others		
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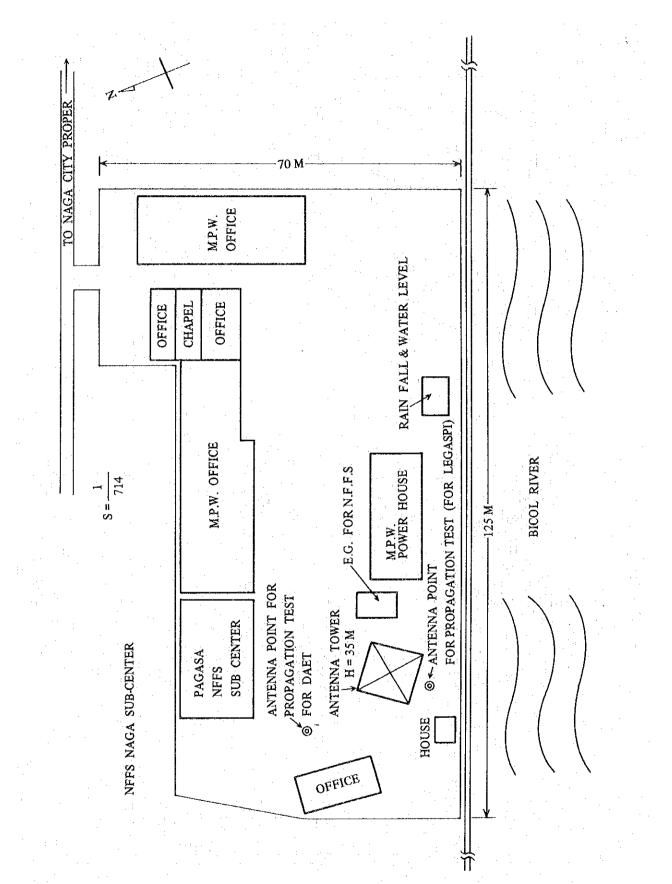


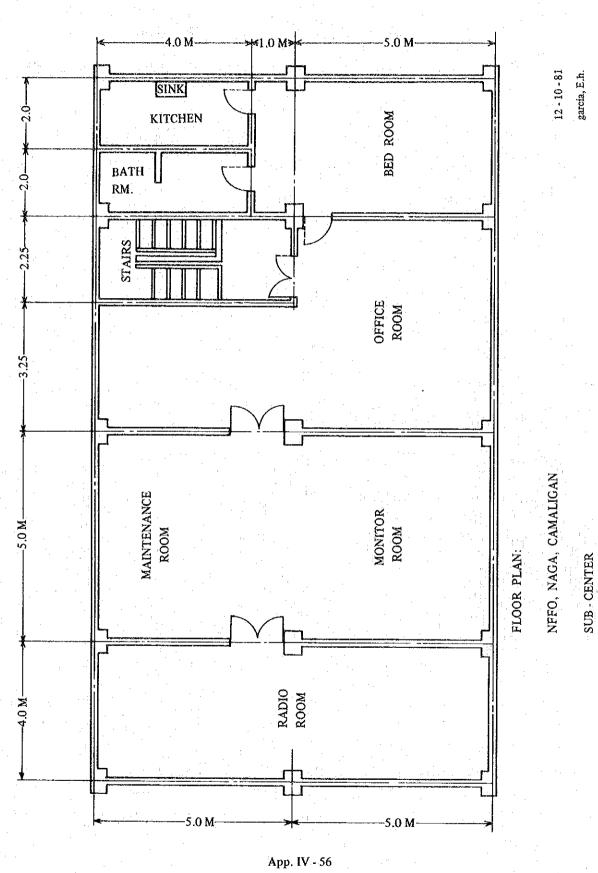
			Item	Judge- ment	Remarks
l.	Picture of	1-1	Span Distance and Above the Sea Level		79.6 KM to LEGASPI, 59.7 KM to DAET 2 M
• .	Route	1-2	Relative Figure of Established Radio Circuit		The new 150MHZ VHF link will be connected with existing FFS (F.F.S 800 MHZ TROPOSCATTER for TANAY is existing)
		1-3	Outline of Direction Angle		142° for LEGASPI 341° for DAET
2.	Place of Candidacy	2-1	Established Station or New		The new 150MHZ VHF link for LEGASPI & DAET will be established. (FFS on 800 MHZ is existing)
		2-2	Geology		plane terrain beside BICOL RIVER damp ground
		2-3	Latitude and Longitude		13° 37' 21'' N 125° 09' 56'' E
		2-4	Above the Sea Level		2M
<u>.</u> .		2-5	Direction Angle		142° for LEGASPI, 341° for DAET
		2-6	Area of Site (Estimate)		approximately 0.5 HA including MPW
		2-7	Owner (Private, Government owned or public)	-	government owned
		2-8	Topography and Geology etc. (Outline)		plane terrain beside BICOL RIVER damp ground, sand stone
		2-9	Take-able Point of Water for Construction		available near the site
· · ·	· ·	2-10	Others		ranked as the FFS SUB CENTER
3.	Road	3-1	Present of Road (Path and Driveway)		good

Table of Survey Items for Radio Station (Field Survey) 11.

•		Item	Judge- ment	Remarks
	3-2	Length of the New Road Needed (km)	с. 	none
	3-3	Length of Road to be repaired (km)		none
	3.4	Figure of Outline (include Established Road)		see the FIG attached
4. Tower	4-1	Established or New Establish		a 35 mH tower for F.F.S is existing
	4-2	Antenna Height from the Ground, or the roof		a 6mØ G.P. is existing The part less than 30 mH of the tower is avail- able
	4-3	Need of Radome		none
	4-4	Propriety of Antenna-Load		possible for YAGI type antenna
5. Power Supply,	5-1	Length of Exclusive New Power Line (km)		none
Electric Power Line	5-2	Obstructive Condition of Commercial Power		cut off more than several times a month, for 2 to 3 hours a time on an average.
	5-3	Present State of Used Power in the Established Station		220V 1Ø 60HZ F.F.S on the 800 MHZ, 70W, TROPOSCATTER for TANAY will be operated near the future (220V, 20KVA, 1Ø, 60HZ E.G. for F.F.S is existing)
5. Station House	6-1	Necessity of New, Extension and Established etc.		none
	6-2	Figure of Present Outline of Established House		see the FIG attached
7. Propa- gation	7-1	Profile		see the profile for the new link NAGA-LEGASP NAGA-DAET
Path of Relations	7-2	Testing of Line of Sight		none mountain diffraction path to LEGASPI & DAE1
	7-3	Outline of Topography around Reflection Points		

	Item	Judge- ment	Remarks
	7-4 Outline of Topography near the Station		plane terrain beside BICOL RIVER
	7-5 Kinds of Propagation Path Models		mountain diffraction path see the profiles for NAGA-DAET NAGA-LEGASPI
8. Vehicles	8-1 Necessity of Particular Cars		none
1	8-2 Necessity of Car Sheds		none
9. Mainte- nance	9-1 Minimum time for Mainte- nance		none
10. Informa- tion Figure of	10-1 Map around Place of Candidacy		see the FIG attached
Road to the Sta-	10-2 Map of Road to the Station		ditto
tion	10-3 Direction of Neighbouring Stations Established		none
11. Others	11-1 Amount of Rainfall in a Ye	ar	
	11-2 Means of Wind-Speed and Main Wind Direction		
	11-3 Poisonous Gas		none
	11-4 Harmful Establishments		none
	11-5 Kinds of Near Radio Statio Systems	n	F.F.S 800MHZ, 70W, SS-PM, 5/6CH TROPO SCATTER for TANAY is in the site
	11-6 Communication Traffic of Relative Area		2 cHs out of F.F.S are available for the new 150MHZ VHF link
	11-7 Condition of Traffic		smooth
	11-8 Present Public Order		peaceful
	11-9 Others		
: . 		App. IV - 5	4





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Table of Survey	· 144	for Dadia	Charles	(122.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1	0	10
1 able of Surve	/ Items	IOT Kadio	Station	riela.	Survey 1	12.

Station: LEGASPI

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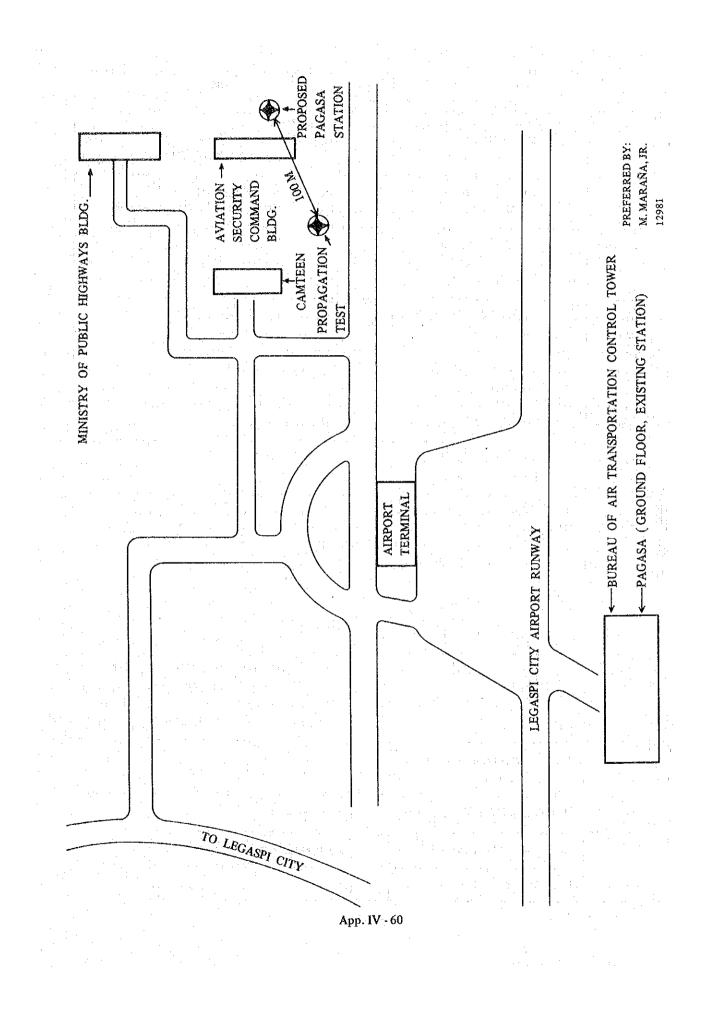
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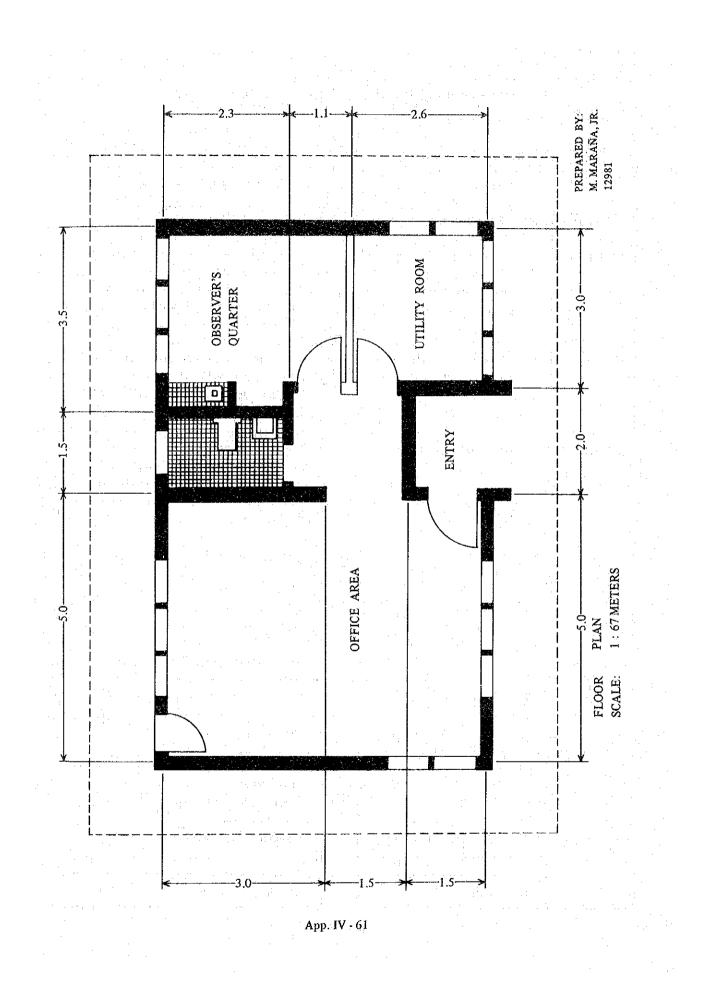
Date 17 November 81

			Item	Judge- ment	Remarks
1.	Picture of	1-1	Span Distance and Above the Sea Level	- - -	79.6 KM to NAGA 76.0 KM to VIRAC 17 M
	Route	1-2	Relative Figure of Establihed Ratio Circuit		none (a HF SSB station & VHF station are existing)
		1-3	Outline of Direction Angle		330° for NAGA, 47° for VIRAC
2.	Place of Candidacy	2-1	Established Station or New		The new 150MHZ VHF link for NAGA & VIRAC will be established. New site to be transferred about 1 & 1/2 KM SW of old site
	en Les El Constantes	2-2	Geology		Rice field - flat terrain
		2-3	Latitude and Longitude		13° 08' N 123° 44' E (old site)
		2-4	Above the Sea Level		17 M
"		2-5	Direction Angle		330° for NAGA, 47° for VIRAC
		2-6	Area of Site (Estimate)		approximately 2 HA
		2-7	Owner (Private, Government- owned or public)		military reservation area
		2-8	Topography and Geology etc (Outline)		flat terrain rocks, underneath sandstone
•		2-9	Take-able Point of Water for Construction		available near the site
-		2-10	Others		new site is about 20 KM from the foot of the MAYON VOLCANO
3.	Road	3-1	Present of Road (Path and Driveway)		good (Asphalt)

		Item	Judge- ment	Remarks
	3-2	Length of the New Road Needed (km)		none
	3-3	Length of Road to be repaired (km)		none
	3-4	Figure of Outline (include Established Road)		see the FIG attached
4. Tower	4-1	Established or New Establish		two 20 mH towers will be needed for the new 150NHZ VHF links
	4-2	Antenna Height from the Ground, or the roof		more than 15 mH will be needed
	4-3	Need of Radome		none
	4-4	Propriety of Antenna-Load		will be designed as the occasion demands
5. Power Supply,	5-1	Length of Exclusive New Power Line (km)		none
Electric Power Line	5-2	Obstructive Condition of Commercial Power		no obstruction
	5-3	Present State of Used Power in the Established Station		220V 1Ø
6. Station House	6-1	Necessity of New, Extension and Established etc.		none
	6-2	Figure of Present Outline of Established House		unknown
7. Propa- gation	7-1	Profile	·	see the profile for the new link NAGA-LEGASF no need for the new link LEGASPI-VIRA
Path of Relations	7-2	Testing of Line of Sight		none line of sight for LEGASPI-VIRAC mountain diffraction path for LEGASPI-NAGA
	7-3	Outline of Topography around Reflection Points		
L	· · · · ·	Aj	pp. IV - :	8

	n Natura	Item	Judge- ment	Remarks
· · · · · · · · · · · · · · · · · · ·	7-4	Outline of Topography near the Station		flat terrain rocks underneath sandstone 20 KM SSW of the MAYON VOLCANO
	7-5	Kinds of Propagation		free space path for LEGASPI-VIRAC
:	1-5	Path Models		mountain diffraction path for LEGASPI-NAGA
3. Vehicles	8-1	Necessity of Particular Cars		none
	8-2	Necessity of Car Sheds		none
). Mainte- nance	9-1	Minimum time for Mainte- nance		approximately 1 hour from NAGA
0. Informa- tion	10-1	Map around Place of Candidacy		see the FIG attached
Figure of Road to the Sta-	10-2	Map of Road to the Station		see the FIG attached
tion	10-3	Direction of Neighbouring Stations Established		none
1. Others	11-1	Amount of Rainfall in a Yea	Ċ	3282.0 mm
	11-2	Means of Wind-Speed and Main Wind Direction		NE/7 KNOTS
	11-3	Poisonous Gas		none
4 4 - 	11-4	Harmful Establishments		none
	11-5	Kinds of Near Radio Station Systems		BUREAU OF AIR TRANSPORTATION) AVIATION SECURITY COMMAND) VHF & PHILIPPINE AIR LINES) HF
1.				MINISTRY OF PUBLIC HIGHWAYS)
:	11-6	Communication Traffic of Relative Area	Э.Т. 	
• • •	11-7	Condition of Traffic		moderate
	11-8	Present Public Order		peaceful
	11-9	Others		
		Aj	pp. IV -	\$9





	Station:	CEBU		Survey	ors: Date 2 December 81
			Item	Judge- ment	Remarks
1.	Picture of	1-1	Span Distance and Above the Sea Level		24.8M
	Route	1-2	Relative Figure of Established Ratio Circuit		The new Communication-sub-center for VISAYAS will be established near future (HF SSB, radar, radiosonde, rawinsonde are existing)
		1-3	Outline of Direction Angle		None direction HF system will be adopted for the sub-center for VISAYAS 350° for DILIMAN & 170° for DAVAO (OH link)
2.	Place of Candidacy		Established Station or New		The new station for communication sub-center for VISAYAS and for UHF link for DILIMAN & DAVAO will be established in the near future
		2-2	Geology		Rolling terrain rocky
		2-3	Latitude and Longitude		10° 20' N 123° 43' E
		2-4	Above the Sea Level		24.8 M
 		2-5	Direction Angle		350° for DILIMAN, 170° for DAVAO
		2-6	Area of Site (Estimate)		approximately 2.7 HA
		2-7	Owner (Private, Government- owned or public)		government owned
		ſ	Topography and Geology etc (Outline)		plane terrain rocky & hilly in the site
		2-9	Take-able Point of Water for Construction		available
		2-10	Others	t sus <u>i</u> s	

Table of Survey Items for Radio Station (Field Survey) 13.

	Item	Judge- ment	Remarks
3. Road	3-1 Present of Road (Path and Driveway)		good
	3-2 Length of the New Road Needed (km)		none
	3-3 Length of Road to be repaired (km)		none
	3.4 Figure of Outline (include Established Road)		see the FIG attached
4. Tower	4-1 Established or New Establish		Three 35mH towers will be needed for the new HF link for the Communication-Center for VISAYAS and for DILIMAN & DAVAO
	4-2 Antenna Height from the Ground, or the roof		more than 35mH will be needed
	4-3 Need of Radome		none
	4-4 Propriety of Antenna-Load		will be designed as the occasion demands
5. Power Supply,	5-1 Length of Exclusive New Power Line (km)		none
Electric Power Line	5-2 Obstructive Condition of Commercial Power		cut off 2 or 3 hours a month 4 hours a time on an average.
	5-3 Present State of Used Power in the Established Station		220V, 3Ø (existing E.G. has been out of order)
6. Station House	6-1 Necessity of New, Extension and Established etc.	-	The new station house will be needed including E.G.
	6-2 Figure of Present Outline of Established House		see the FIG attached
7. Propa- gation	7-1 Profile		none
Path of	7-2 Testing of Line of Sight		none
Relations	7-3 Outline of Topography around Reflection Points		

1.

· · · ·	Item	Judge- ment	Remarks
· · · · · · · · · · · · · · · · · · ·	7-4 Outline of Topography near the Station		plain terrain, rocky & hilly in the site
	7-5 Kinds of Propagation Path Models		ionospheric reflected propagation path, tropo- spheric scattering propagation path
8. Vehicles	8-1 Necessity of Particular Cars		none
an a	8-2 Necessity of Car Sheds		none
9. Mainte- nance	9-1 Minimum time for Mainte- nance		none
10. Informa- tion Figure of	10-1 Map around Place of Candidacy		see the FIG attached
Road to the Sta-	10-2 Map of Road to the Station	1	ditto
tion	10-3 Direction of Neighbouring Stations Established		
11. Others	11-1 Amount of Rainfall in a Year	c	1677.1 mm
	11-2 Means of Wind-Speed and Main Wind Direction		NE/5 KNOTS
	11-3 Poisonous Gas		none
	11-4 Harmful Establishments		none
	11-5 Kinds of Near Radio Station Systems		microwave radio stations (PLDT, BAT, PAR PAL)
	11-6 Communication Traffic of Relative Area		
	11-7 Condition of Traffic		smooth
:	11-8 Present Public Order		peaceful
	11-9 Others		The site is situated at 1KM distance to the south of CEBU airport.
		pp. IV - 6	in an
		· .	

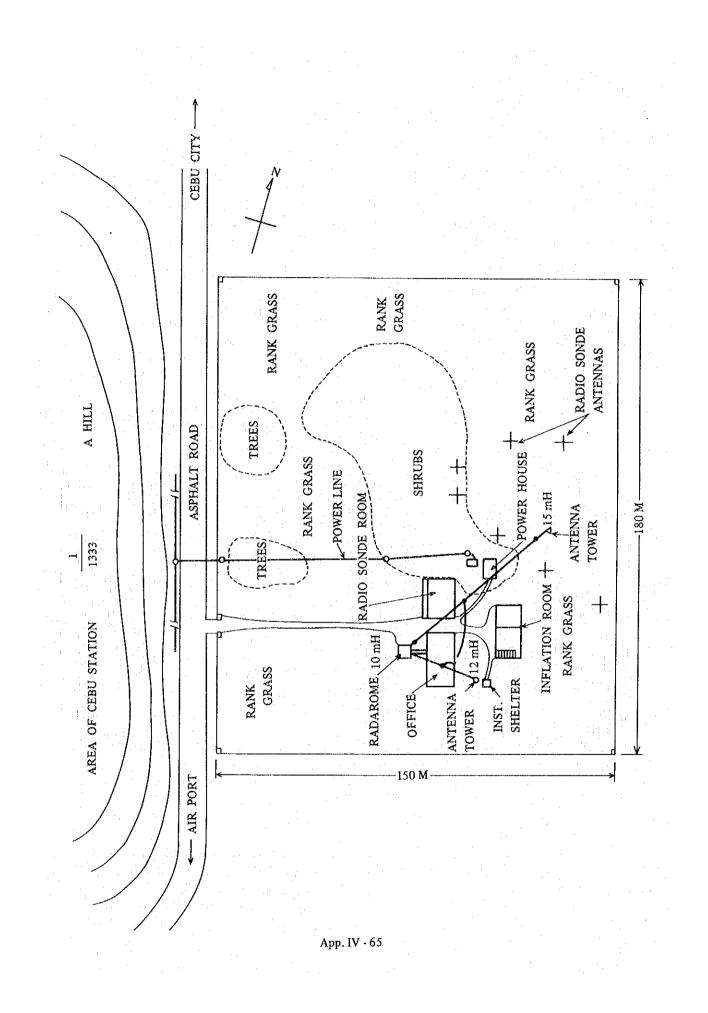


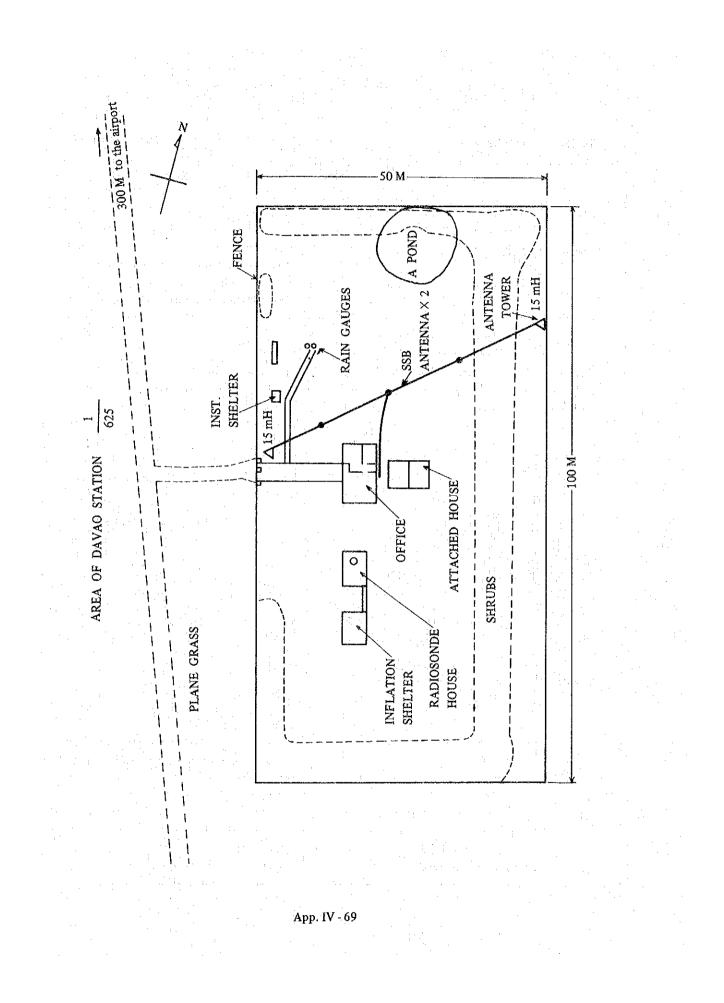
Table of Survey Items for Radio Station (Field Survey) 14.

•	Station:	DAVA	0	Survey	Date 4 December 81
	<u></u>		Item	Judge- ment	Remarks
1.	Picture of	1-1	Span Distance and Above the Sea Level		17.89 M
	Route	1-2	Relative Figure of Established Radio Circuit		The new communication subcenter for Mindana will be established in the near future. (existing bad communication facilities, 260 r south, 1150 m north).
•		1-3	Outline of Direction Angle		None direction system will be adopted for th Sub Center. for Mindanao by HF. 350° for CEBU(UHF link)
2.	Place of Candidacy	2-1	Established Station or New		The new H F station for Communication-Sul Center for Mindanao and for UHF link for CEB will be established in the near future.
		2-2	Geology		Corals
		2-3	Latitude and Longitude		07° 12' N 125° 05' E
· :		2-4	Above the Sea Level		17.89 m
•		2-5	Direction Angle		350° for CEBU
		2-6	Area of Site (Estimate)		0.5HA
:		2.7	Owner (Private, Government- owned or public)		Government owned
•	• • : •	2-8	Topography and Geology etc (Outline)		Lane terrains, corals
		2-9	Take-able Point of Water for Construction		Always available
		2-10	Others		very near to the DAVAO INTERNATIONA AIR PORT

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			Item	Judge- ment	Remarks
3.	Road	3-1	Present of Road (Path and Driveway)		accessible
		3-2	Length of the New Road Needed (km)		none
	· · ·	3-3	Length of Road to be repaired		none
		3-4	Figure of Outline (include Established Road)		see the FIG attached
 1.	Tower	4-1	Established or New Establish		Three 35 mH towers will be needed for the new HF links for the communication-center for MINDANAO, and for UHF link for CEBU.
		4-2	Antenna Height from the Ground, or the roof		more than 35 mH will be needed.
		4-3	Need of Radome		none
		4-4	Propriety of Antenna-Load		will be designed as the occasion demands
5.	Power Supply, Electric	5-1	Length of Exclusive New Power Line (km)	· · ·	none
	Power Line	5-2	Obstructive Condition of Commercial Power		stable
		5-3	Present State of Used Power in the Established Station		220V 1Ø 60HZ stable
5.	Station House	6-1	Necessity of New, Extension and Established etc.		The new station house will be needed including E.G.
		6-2	Figure of Present Outline of Established House		see the FIG attached
, ·	Propa-	7-1	Profile		none
	gation Path of Relations	7-2	Testing of Line of Sight		none
	Relations	7-3	Outline of Topography around Reflection Points		

	Item	Judge- Remarks ment
	7-4 Outline of Topography near the Station	plane terrain corals
	7-5 Kinds of Propagation Path Models	Ionospheric reflected propagation path and tropospheric scattering propagation path
8. Vehicles	8-1 Necessity of Particular Cars	none
- - -	8-2 Necessity of Car Sheds	none
9. Mainte- nance	9-1 Minimum time for Mainte- nance	none
10. Informa- tion	10-1 Map around Place of Candidacy	see the FIG attached
Figure of Road to	10-2 Map of Road to the Station	see the FIG attached
the Sta- tion	10-3 Direction of Neighbouring Stations Established	
11. Others	11-1 Amount of Rainfall in a Yea	r 1820.4 mm
	11-2 Means of Wind-Speed and Main Wind Direction	N/4 KNOTS
	11-3 Poisonous Gas	none
	11-4 Harmful Establishments	none
	11-5 Kinds of Near Radio Station Systems	Microwave, HF, VHF (BAT & PAL)
	11-6 Communication Traffic of Relative Area	
	11-7 Condition of Traffic	smooth
* 3	11-8 Present Publice Order	peaceful
	11-9 Others	
		app. IV - 68
· · · · · ·	· ·	

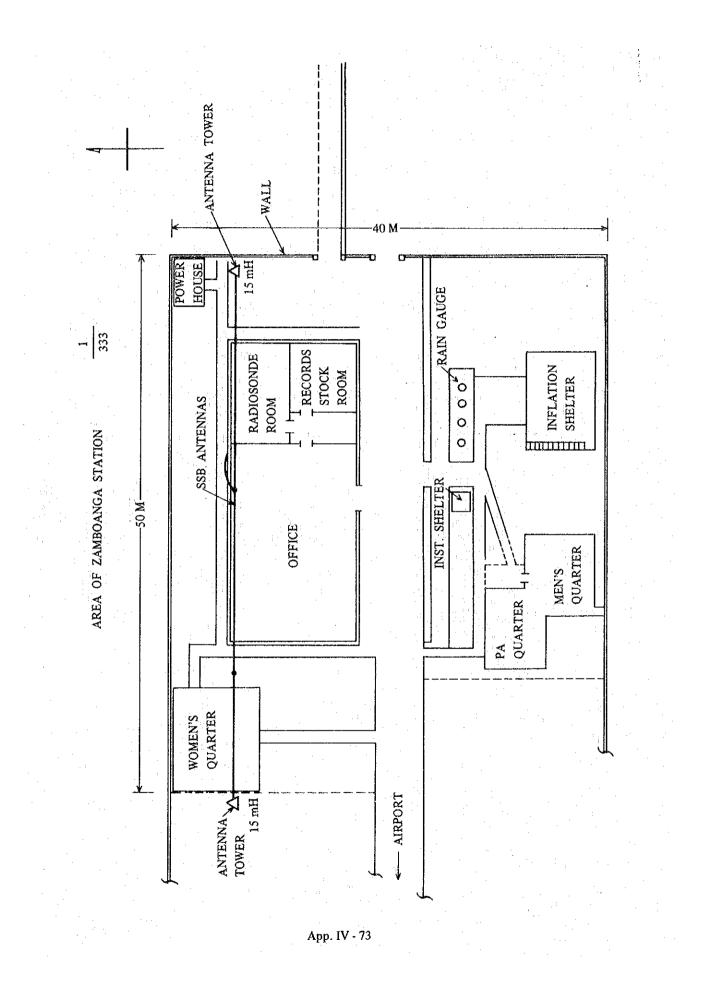


Station:	ZAMBOANGA	Surveyo	rs: Date 5 December 81
· · · ·	Item	Judge- ment	Remarks
1. Picture of	1-1 Span Distance and Above the Sea Level		6 M
Route	1-2 Relative Figure of Established Radio Circuit		The new HF link for the sub-center at DABC will be established near future. (HF SSB link is existing)
	1-3 Outline of Direction Angle		
2. Place of	2-1 Established Station or New		The new HF station
or Candidacy	2-2 Geology		plane terrain ordinary soil
	2-3 Latitude and Longitude		06° 54′ N 122° 04′ E
•	2-4 Above the Sea Level		6 M
	2-5 Direction Angle		
	2-6 Area of Site (Estimate)		approximately 1200 m ²
	2-7 Owner (Private, Government owned or public)	-	government owned
	2-8 Topography and Geology etc (Outline)	× · · ·	plane terrain ordinary soil
	2-9 Take-able Point of Water for		always available
	2-10 Others		very near to the ZAMBOANGA AIR PORT
3. Road	3-1 Present of Road (Path and Driveway)		good
	3-2 Length of the New Road Needed (km)		none
	A A	pp. IV - 7	0

Table of Survey Items for Radio Station (Field Survey) 15.

	• •• .1	Item	Judge- ment	Remarks
	3-3	Length of Road to be repaired (km)		none
	3-4	Figure of Outline (include Established Road)		
4 Tower	4-1	Established or New Establish		two 20 mH towers will be needed
	4-2	Antenna Height from the Ground, or the roof		more than 15 mH will be needed
. •	4-3	Need of Radome		none
	4-4	Propriety of Antenna-Load		will be designed as the occasion demands
5. Power Supply,	5-1	Length of Exclusive New Power Line (km)		none
Electric Power Line	5-2	Obstructive Condition of Commercial Power		stable
	5-3	Present State of Used Power in the Established Station		220V 1Ø 60Hz stable 3 KVA E.G. will be needed (1.5 KVA E.G. has been out of order since November 20 81)
6. Station House	6-1	Necessity of New, Extension and Established etc.		a new power house will be needed
	6-2	Figure of Present Outline of Established House		see the FIG attached
7. Propa- gation	7-1	Profile		none (propagation path by H.F.)
Path of	7-2	Testing of Line of Sight		none
Relations	7-3	Outline of Topography around Reflection Points		
	7-4	Outline of Topography near the Station		plane terrain ordinary soil
:	7-5	Kinds of Propagation Path Models		ionospheric reflected propagation path
	. · ·	Ар	p. IV - 7	1 1 1 1 1 1 1 1

	Item	Judge- ment	Remarks
8. Vehicles	8-1 Necessity of Particular Cars		none
en e	8-2 Necessity of Car Sheds		none
9. Mainte- nance	9-1 Minimum time for Mainte- nance		1 hour from DAVAO by air liner
10. Informa- tion	10-1 Map around Place of Candidacy		see the FIG attached
Figure of Road to	10-2 Map of Road to the Station		ditto
the Sta- tion	10-3 Direction of Neighbouring Stations Established		
11. Others	11-1 Amount of Rainfall in a Yea	r	1198.8 mm
	11-2 Means of Wind-Speed and Main Wind Direction	:	W/4 KNOTS
	11-3 Poisonous Gas		none
	11-4 Harmful Establishments		none
	11-5 Kinds of Near Radio Station		microwave, HF, UHF (BAT, PAL, PAF)
	11-6 Communication Traffic of Relative Area		some interference experienced on existing SSB link especially at night.
	11-7 Condition of Traffic		smooth
	11-8 Present Public Order		peaceful
	11-9 Others		The site is situated at 700M distance to the south of the run way of Zamboanga airport.



APPENDIX V

AN EXPLANATION ON RADIO WAVE PROPAGATION AND LINK BUDGET OF THE VHF BAND

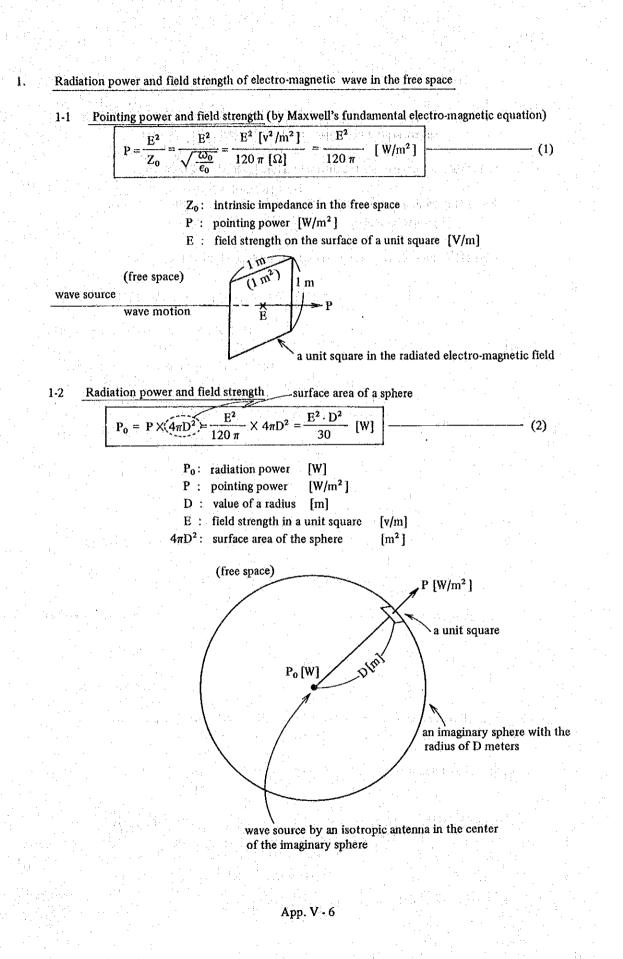
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1-3 Field strength and transmitting power by an antenna of gain Gt and of feeder loss Lft

:		$P_0 = Pt \cdot Gt \cdot \frac{1}{Lft} = \frac{E^2 \cdot D^2}{30} \qquad \left(= \frac{1}{1} \right)$	$\frac{\mathrm{E}^2}{20 \pi} \cdot 4 \pi \mathrm{D}^2 \right) [\mathrm{W}]$	- (2)'
	•	$B^{2} = \frac{30 \cdot Pt \cdot Gt \cdot \frac{1}{Lft}}{1}$		(3)
	· .	D ²		(5)
a	1.1 • 1	$E = \frac{\sqrt{30 \cdot Pt \cdot Gt \cdot \frac{1}{Lft}}}{[v/m]}$. (4)
:		D []		. (1)

P ₀ :	radiated power (effective radiated power)	[W]
Pt:	transmitting power (out put power of a transmitter)	[W]
Gt:	value of a gain of a transmitting antenna (absolute gain)	
Lft:	value of a loss of a transmitting feeder	
D:	value of a distance from a transmitting point	[m]
E:	field strength at the point which is D meters away from	
	the source	[V/m]
		n gre

The equation (3) is converted into the next in which the dimensions are Pt [W], E $[\mu V/m]$ and D [m] or D [Km].

20 logE $[\mu V/m]$ + 20 log 10⁻⁶ = 10 log 30 + 10 logPt [W] + 10 logGt - 20 log D[m] - 10 logLft

 $20 \log E [\mu V/m] = 10 \log Pt[W] + 10 \log Gt - 10 \log Lft - 20 \log D[m] + 120 + 14.77$

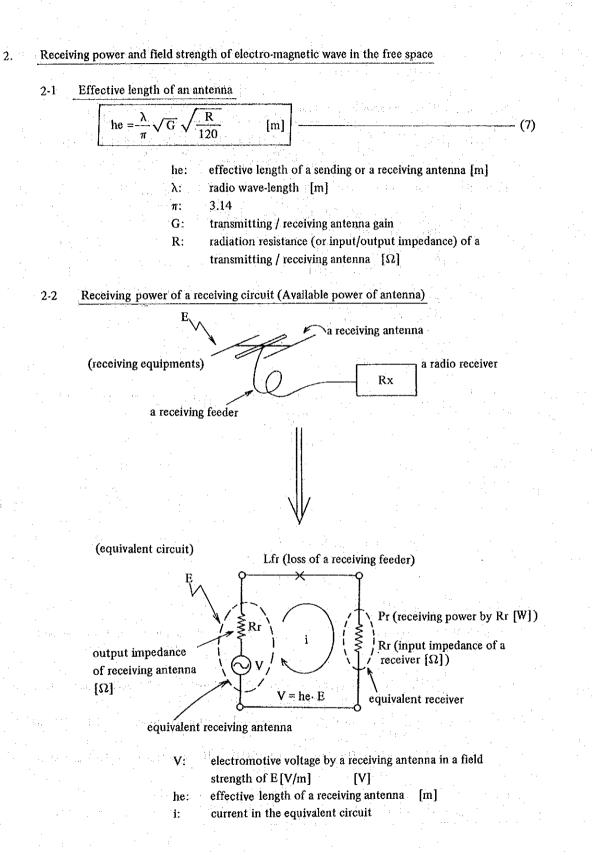
$E[dB/\mu] = Pt[dB/W] + Gt[dB] - Lft[dB] - 20 \log D[m] + 134.77$	(D:[m]) —(5)
$E[dB/\mu] = Pt[dB/W] + Gt[dB] - Lft[dB] - 20 \log D[Km] + 74.77$	(D : [Km]) -(6)

Field strength in the free space

table (1)

As the equation (6) is $E[dB/\mu] = Pt[dB/W] + Gt[dB] - Lft[dB] - 20 \log D[Km] + 74.77$ using Pt = 1 [W] = 0[dB], Gt = 1 = 0[dB]. Lft = 1 = 0[dB], then following table is to be made. (isotropic antenna)

E[dB/µ] 30.3 30.0 30.0 30.0 29.9 30.9 30.9 30.8 30.7 30.6 30.6 30.5 30.5 30.4 30.4 30.3 30.2 30.2 30.0 31.2 31.1 31.1 31.0 31.0 30.7 * Add 10 log Pt[W] if Pt ≠ 1 [W] D[Km] 168 169 158 159 160 163 164 172 156 161 162 165 166 167 170 171 172 174 175 154 155 157 151 152 153 $E[dB/\mu]$ 32.0 31.6 31.5 31.5 31.4 31.4 31.3 31.2 32.3 32.0 32.0 31.8 31.8 31.7 31.7 32.6 32.6 32.5 32.4 32.4 32.2 32.2 32.1 32.8 32.7 D[Km] 146 138 139 143 147 148 149 150 128 134 140 142 144 145 126 129 130 131 132 133 135 136 137 141 127 E[dB/µ] 33.9 33.6 33.0 32.9 32.8 34.1 34.0 33.9 33.8 33.7 33.6 33.5 33.4 33.3 33.3 33.2 33.1 33.0 34.3 34.2 34.6 34.5 34.4 34.3 34.7 D[Km] 1.15 116 117 118 119 112 113 114 120 121 122 123 124 109 110 03 03 105 8 107 108 111 125 8 101 $E[dB/\mu]$ 35.5 35.0 34.8 35.4 34.9 36.3 36.2 36.0 35.9 35.8 35.7 35.6 35.3 35.2 35.1 34.9 36.5 36.4 36.1 37.0 36.9 36.8 36.7 36.6 37.2 D[Km] 76 77 78 79 80 85 83 83 84 81 E[dB/u] 38.0 37.9 37.6 37.4 37.3 38.9 38.8 38.6 38.5 38.4 37.7 37.5 40.3 40.0 39.8 39.5 39.4 39.2 38.2 38.1 40.6 40.4 39.7 39.1 40.1 D[Km] ŝ 69 71 71 72 73 75 75 63 2 66 67 68 54 55 S6 57 59 60 62 51 52 61 E[dB/µ] 41.9 41.3 41.0 40.8 43.6 43.4 43.2 42.9 42.7 42.5 42.3 41.5 44 43.8 42.1 41.7 41.1 46.5 45.8 45.5 45.2 44.9 44.7 46.1 44.1 D[Km] 32 34 40 \$ 43 44 45 46 47 48 49 35 35 37 38 39 41 50 26 27 29 30 31 31 $E[dB/\mu]$ 51.8 50.7 50.2 49.7 49.2 48.3 47.9 46.8 60.8 57.9 56.7 55.7 54.8 53.9 53.2 52:5 51.2 48.7 47.5 47.2 74.8 68.7 65.2 62.7 59.2 D [Km] 14 15 16 17 18 19 2 2 13 App. V - 8



- The receiving equipments sketched above is able to be written into the equivalent circuit 2-2-1 as shown below in the figure.
- According to the equivalent circuit: 2-2-2

	$P_{T} = i^{2} \cdot Rr \cdot \frac{1}{Lfr} = \left(\frac{V}{2Rr}\right)^{2} \cdot Rr \cdot \frac{1}{Lfr} = \left(\frac{E \cdot he}{2Rr}\right)^{2} \cdot Rr \cdot \frac{1}{Lfr} = \frac{E^{2} \cdot he^{2}}{4Rr} \frac{1}{Lfr}$	[W]	(8)
1			

2.2.3 If the equation (7) is substituted into the equation (8)

Pr =	$\frac{\mathbf{E}^2 \cdot \mathbf{he}^2}{4\mathbf{Rr}} \frac{1}{\mathbf{Lfr}} = \frac{\mathbf{E}^2}{4\mathbf{Rr}} \frac{1}{\mathbf{Lfr}}$	$\frac{1}{\sqrt{2}}$	$\overline{\mathrm{Gr}} \cdot \sqrt{\frac{\mathrm{Rr}}{\mathrm{120}}}^2$
1 1 1	$\frac{E^2}{4Rr} \cdot \frac{1}{Lfr} \frac{\lambda^2}{\pi^2} \cdot Gr \cdot \frac{Rr}{120}$	N. S.	
Ħ	$\frac{\mathrm{E}^2}{120 \pi} \cdot \frac{\lambda^2}{4\pi} \cdot \mathrm{Gr} \cdot \frac{1}{\mathrm{Lfr}}$	· · ·	
	$\frac{E^2 \cdot \lambda^2}{480 \pi^2} \cdot \operatorname{Gr} \cdot \frac{1}{\operatorname{Lfr}}$		
Pr =	$\frac{\mathrm{E}^2}{120\pi}\cdot\frac{\lambda^2}{4\pi}\cdot\mathrm{Gr}\cdot\frac{1}{\mathrm{Lfr}}$	[W]	
01	$r^2 \lambda^2 = 1$		
Pr =	$\frac{\mathbf{E}^2 \cdot \lambda^2}{1}$, $\mathbf{G}_{\mathbf{T}}$, $\frac{1}{1}$	ิศพา	i

E: field strength at a receiving point [V/m]

[W]

- λ; radio wave-length [m]
- Gr: receiving antenna gain
- Lfr: receiving feeder loss
- Pr: receiving power [W]
- is given

 $P_{r} =$

 $480 \pi^2$

8. F. 2-2.4 If the dimensions of Pr[W], $E[\mu V/m]$, $\lambda[m]$ are used, the equation (10) is given as the

Lfr

- following equation. site and a state
 - $10 \log \Pr[W] = 20 \log E[\mu V/m] + 20 \log 10^{-6} + 20 \log \lambda[m] + 10 \log Gr[times] 10 \log 480 10 \log R$ $20 \log \pi - 10 \log Lfr[times]$
 - = $20 \log E[\mu V/m]$ + $20 \log \lambda[m]$ + $10 \log Gr[times]$ $10 \log Lfr[times]$ -120 - 26.81 - 9.94

(9)

(10)

- = 20 log E[μ V/m] + 20 log λ [m] + 10 logGr[times] 10 logLfr[times] -
 - 156.75

... $Pr[dB/W] = E[dB/\mu] + Gr[dB] - Lft[dB] + \lambda[dB/m] - 156.75$ (11)

This is the equation between the receiving power $\Pr[dB/W]$ and the field strength $E[dB/\mu]$.

2-3 Effective area of antenna

2-3-1 According to the equation (9):

$$\Pr = \frac{E^2}{120 \pi} \frac{\lambda^2}{4\pi} \cdot Gr \cdot \frac{1}{Lfr} \qquad [W]$$

pointing power in the field strength of Ae: effective area by the antenna of gain Gr E[V/m] shown by the equation (1)

$\therefore Pr = P \cdot Ae \cdot \frac{1}{Lfr} \qquad [W]$](12)
 $\therefore \qquad Ae = \frac{\lambda^2}{4\pi} Gr \cdot [m^2]$](13)

are given.

										-			· ·		· ·						- . .						
table (2)	eis	1	[dB/µ]	[dB/µ]	\$ (52),(53)			đ)	Vr	[dB/µ]	25.7	16.7	27.7	28.7	29.7	30.7	31.7	32.7	33.7	34.7	35.7	36.7	37.7	38.7	39.7	40.7	t · · ·
- - - -	The threshold levels	Pth = -144.7		Vrth = -7.7	See the equations (52),(53)	and (24).	1. 1. 1.	are under line	Vro	[dB/µ]	31.7	32.7	33.7	34.7	35.7	36.7	37.7	38.7	39.7	40.7	41.7	42.7	43.7	4	45.7	46.7	r T
	The	<u>р</u> .		<u>}</u>	See] 11		reshold level	Pr	[dB/W]	-111.3	-110.3	-109.3	-108.3	-107.3	-106.3	-105.3	-104.3	-103.3	-102.3	-101.3	-100.3	- 99.3	- 98.3	- 97.3	- 96.3	
150 [MHZ]					• ;	20 (open) = 2 5[dB] (8D-2V 25m efc.) λ[dB] ≡ 20[oe 2[m]	made.	(The value of 0.4 [dB] above the threshold level are under lined)	μı	[dB/µ]	31	32	33	34	35	36	37	38	39	4	41	42	43	4	45	46	ţ
ge in case of				g voltage are		etc))[dB]	able is to be	e of 0.4 [dB]	Vr	$[dB/\mu]$	1.7	-8.7	6.7	10.7	11.7	12.7	13.7	14.7	15.7	16.7	17.7	18.7	19.7	20.7	21.7	22.7	ECC
eceiving volta			156.75	open receivin	(stational)	(open) (8D-2V 25m	= 17[dB], the following table is to be made.	(The valu	Vro	[dB/µ]	13.7	14.7	15.7	16.7	17.7	18.7	19.7	20.7	21.7	22.7	23.7	24.7	25.7	26.7	27.7	28.7	000
ring power, Ro			+ λ[dB/m] - 156.75	itage and the	20		, 11		Pr	[dB/W]	-129.3	-128.3	-127.3	-126.3	-125.3	-124.3	-123.3	-122.3	-121.3	-120.3	-119.3	-118.3	-117.3	-116.3	-115.3	-114.3	
Field strength and Receiving power, Receiving voltage in case of 150 [MHZ]		য়	$\Pr[dB/W] = E[dB/\mu] + Gr[dB] - Lfr[dB] +$	From the equation (21) and (22), the stational receiving voltage and the open receiving voltage are	$= \Pr[dB/W] + 10 \log Rr[\Omega] + 120$	Vr ₀ [dB/µ] = Yr[dB/W] + 10 log Kr[ss] + 126 C-14b1 - 11 [4b] (8 elements Vent time) I fr[dB] = 2	Using $O_1(up) = 11[up]$ (a contraction 1 and 19 log 50[Ω] = 10 log 50[Ω]	1.	цц цц	[dB/µ]	13	14	15	16	17	18	19	50 -1	21	22	23	24	25	26	27	28	(
Field stren		From the equation (11), the receiving power is	[dB/µ] + Gr[(2), the station	[dB/W] + 10	rt(db/W] + II dements Vari	0 log Rr[Ω] =		Vr	[dB/µ]	-10.3	- 9.3	- 8.3	- 7.3	- 6.3	- 5.3	- 4 3 E	т. 33	- 2.3	- 1.3	- 0.3	0.7	1.7	2.7	3.7	4.7	
·	•	n (11), the rec	r[dB/W] = E	n (21) and (2)	$Vr\left[dB/\mu\right] = P_1$	/T ₀ [dB/µ] = J = 11 LAD] /2	OMHZ), and 10	•	Vro	[dB/µ]	4 .0	-3.3	-2.3	-13	-0.3	0.7	1.7	2.7	3.7	4.7	5.7	6.7	7.7	8.7	6.7	10.7	
		n the equatio	P 4	n the equatio		Vrian C-fdD1	[dB] (f = 15(Pr	[dB/W]	-147.3	-146.3	-145.3	-144.3	-143.3	-142.3	-141.3	-140.3	-139.3	-138.3	-137.3	-136.3	-135.3	-134.3	-133.3	-132.3	
: :		Froi		Fror			<u>ە</u> د		μ	[dB/µ]	- S	1 4	ε	2-		0		64	ŝ	4	ŝ	9	. 2	00	6	10	
		:		•		· .						A	.pp	v.	12									:		•	_

3-1 Transmitting power and field strength

According to the equation (2)',

$$Pt \cdot Gt \cdot \frac{1}{Lft} = \frac{E^2}{120 \pi} \cdot 4\pi D^2$$
$$\frac{E^2}{120 \pi} = \frac{1}{4\pi D^2} \cdot Pt \cdot Gt \cdot \frac{1}{Lft} \quad [W/m^2]$$

is given

3.

3-2 Receiving power and field strength

According to the equation (9)

	E2	λ^2	1				
. Р	$r = \frac{L}{100}$	$\frac{\pi}{1}$ Gr	·	[W]			(9)
	120 π	4π	Ltr			1.1.1.1.1	(reappeared)
	:				- · ·		(icappeared)

(14)

is given.

3-3 Receiving power and transmitting power

3-3-1 If the equation (14) is substituted into the equation (9):

$$Pr = \frac{1}{4\pi D^{2}} \cdot Pt \cdot Gt \cdot \frac{1}{Lft} \cdot \frac{\lambda^{2}}{4\pi} \cdot Gr \cdot \frac{1}{Lfr}$$
$$\frac{E^{2}}{120\pi} \text{ by the equation (14)}$$
$$= \left(\frac{\lambda}{4\pi D}\right)^{2} Pt \cdot Gt \cdot \frac{1}{Lft} \cdot Gr \cdot \frac{1}{Lfr}$$
$$\therefore Pr = \left(\frac{\lambda}{4\pi D}\right)^{2} \cdot Pt \cdot Gt \cdot Gr \cdot \frac{1}{Lft} \cdot \frac{1}{Lfr} [W]$$
(15)

This is the relative equation of the receiving power Pr[W] and sending power Pt[W].

3-3-2 In the equation (15), the part $(\lambda/4\pi D)^2$ can be called as the propagation gain. However, there is no propagation gain in fact but propagation loss in the free space. Therefore, changing a formula of the part as below;

$$\left(\frac{\lambda}{4\pi D}\right)^2 = \frac{1}{\left(\frac{4\pi D}{\lambda}\right)^2} = \frac{1}{\Gamma}$$

 Γ is called Free space propagation loss.

	$\left[\left(4\pi D \right)^2 \right]$	
-	$\Gamma = \left(\frac{1}{\lambda} \right)$	

3.3.3 If the equation (16) is substituted in to the equation (15),

$Pr = Pt \cdot Gt \cdot Gr \cdot \frac{1}{Lft} \cdot \frac{1}{Lfr} \cdot \frac{1}{\Gamma} \qquad [W]$	(17)
---	------

is given. This is the relative equation of the receiving power Pr[W] and the transmitting power Pt[W], and is also called the Basic equation of propagation in the free space.

Pr:	receiving power [W]
Pt:	transmitting power [W]
n de la dela Seconda de la dela	(output power of a transmitter
Gt:	transmitting antenna gain
Gr:	receiving antenna gain
Lft:	transmitting feeder loss
Lfr:	receiving feeder loss
Γ.	free space propagation loss

3.3.4 If the dimensions of D[Km] and λ [m] are used, the equation (16) and (17) are given as the following equations.

$10 \log \Gamma = 20 \log 4\pi + 20 \log D[Km] + 20 \log 10^3 - 20 \log \lambda[m]$
$= 21.98 + 20 \log D[Km] + 60 - 20 \log \lambda[m]$

an an tha sa tha a		
: Г [d	B] = $81.98 + D[dB/Km] - \lambda[dB/m]$	(18)
Or		
. Γ [d	$B] = 21.98 + D[dB/m] - \lambda[dB/m]$	—(19)
and		
. Pr[d	$B/W] = Pt[dB/W] + Gr[dB] + Gr[dB] - Lft[dB] - Lfr[dB] - \Gamma[dB]$	(20)

Free space propagation loss in case of 150MHZ

table (3)

 $\Gamma[dB] = 81.98 + D[dB/Km] - \lambda[dB/m]$

from the equation (18)

where λ [dB/m] = 20 log 2[m] = 6[dB] (f = 150MHZ, λ = 300/150 = 2[m]) D[dB/Km] = 20 log D[Km]

•

* subtract 60[dB] from I if the dimension of D is [m]

		- 	•														. :					an La se			. '
r[dB]	119.6	119.6	119.7	119.7	119.8	119.8	119.9	120.0	120.0	120.1	120.1	120.2	120.2	120.3	120.3	120.4	120.4	120.5	120.5	120.6	120.6	120.7	120.7	120.8	120.8
D[Km]	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175
<u>.</u>	118.0	113.1	1.811	118.2	118.3	118.3	118.4	118.5	118.5	118.6	118.7	118.7	118.8	-118.8	118.9	119.0	119.0	119.1	1.911	119.2	119.3	119.3	119.4	119.4	119.5
D[Km]	126-	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150
[ab]7	116.1	116.2	116.2	116.3	116.4	116.5	116.6	116.6	116.7	116.8	116.9	117.0	117.0	117.1	117.2	117.3	117.3	117.4	117.5	117.6	117.6	117.7	117.8	117.8	117.9
D[Km]	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125
Γ[dB]	113.6	113.7	113.8	113.9	114.0	114.1	114.3	114.4	114.5	114.6	114.7	114.8	114.9	115.0	115.1	115.2	115.3	115.3	115.4	115.5	115.6	115.7	115.8	115.9	116.0
D[Km]	76	77	78	79	80	81	82	83	84	85	86	87	88	89	60	91	92	63	94	95	96	97	98	66	100
r[dB]	110.1	110.3	110.5	110.6	110.8	110.9	111.1	111.2	111.4	111.5	111.7	111.8	112.0	112.1	112.2	112.3	112.5	112.6	112.8	112.9	113.0	113.1	113.2	113.3	113.5
D[Km]	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	11	72	73	74	75
r[dB]	104.3	104.6	104.9	105.2	105.5	105.8	106.1	106.4	106.6	106.9	107.1	107.3	107.6	107.8	108.0	108.2	108.4	108.6	108.8	109.0	109.2	109.4	109.6	109.8	110.0
D[Km]	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
[dB]	76.0	82.0	85.5	88.0	0.06		92.9	94.0	95.1	96.0	96.8	97.6	98.3	98.9	- 99.5	100.1	100.6	101.1	101.6	102.0	102.4	102.8	103:2	103.6	103.9
D[Km]	7	2	ε Γ	4	Ś	Q	~	80	6	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
· ·				:		•	Å	.pp.	v	15		• .			· .									4 . 1	1

4. Receiving power and receiving voltage of a radio receiver

4-1 According to the picture drawn below

 $P_{I} = -$

$$\frac{Vr^{2}}{Rr} \quad [W] \qquad \therefore \quad Vr^{2} = Pr \cdot Rr \qquad [V^{2}]$$

- Vr: stational receiving voltage [V]
- Pr: receiving power [W]
- Rr: input impedance of a receiver $[\Omega]$
- 4.2 The above equation is converted into the next equations in which dimensions are Pr[W], $Vr[\mu V]$ and $Rr[\Omega]$.

$$20 \log Vr[\mu V] + 20 \log 10^{-6} = 10 \log Pr[W] + 10 \log Rr[\Omega]$$

 $20 \log Vr[\mu V] = 10 \log Pr[W] + 10 \log Rr[\Omega] + 120$

$$\therefore \quad Vr[dB/\mu] = Pr[dB/W] + 10 \log Rr[\Omega] + 120 \quad (stational) \qquad (21)$$

ог

:.

$$Vr_0 [dB/\mu] = Pr[dB/W] + 10 \log Rr[\Omega] + 126$$
 (open) ------(22)

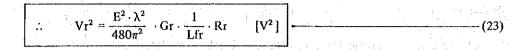
- 5. Field strength and receiving voltage of a radio receiver
 - 5-1 According to the equation (10) on the page No. 10

$$\Pr = \frac{E^2 \cdot \lambda^2}{480 \pi^2} \cdot \operatorname{Gr} \cdot \frac{1}{L \operatorname{fr}} \qquad [W]$$

----- (10) (reappeared)

5-2 If, $Pr = \frac{Vr^2}{Rr}$ is substituted in to the equation above:

$$\frac{\mathrm{Vr}^2}{\mathrm{Rr}} = \frac{\mathrm{E}^2 \cdot \lambda^2}{480 \, \pi^2} \cdot \mathrm{Gr} \cdot \frac{1}{\mathrm{Lfr}} \qquad [W]$$



is given.

or

5.3 The above equation is converted into the next equation inwhich the dimensions are $Vr[\mu V]$, $E[\mu V/m]$ and $\lambda[m]$.

 $\begin{aligned} 20 \log Vr[\mu V] &= 20 \log E[\mu V/m] + 20 \log \lambda[m] + 10 \log Gr \\ &+ 10 \log Rr[\Omega] - 10 \log 480 - 20 \log \pi - 10 \log Lfr \\ &= 20 \log E[\mu V/m] + 20 \log \lambda[m] + 10 \log Gr \\ &+ 10 \log Rr[\Omega] - 26.80 - 9.93 - 10 \log Lfr \end{aligned}$

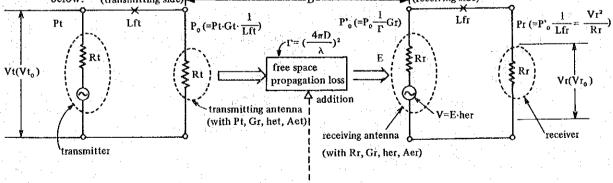
 $\therefore \quad Vr[dB/\omega] = E[dB/\omega] + \lambda[dB/m] + Gr[dB] + 10 \log Rr[\Omega] - Lfr[dB] - 36.73$ (24) (stational)

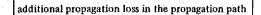
$$\therefore \quad Vr_0 [dB/\omega] = E[dB/\omega] + \lambda[dB/m] + Gr[dB] + 10 \log Rr[\Omega] - Lfr[dB] - 30.73 - (25) \cdot (open)$$

6. Meaning about the basic equation of radio wave propagation in the free space

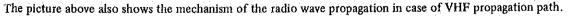
$$(Pr = Pt \cdot Gt \cdot \frac{1}{Lft} \cdot \frac{1}{\Gamma} \cdot Gr \cdot \frac{1}{Lfr} \quad \dots \quad \text{according to the equation (17)})$$

The meaning of the basic equation of radio wave propagation in the free space is shown as the picture below. (transmitting side)



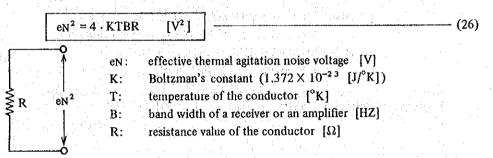


- 1. mountain-ridge diffraction loss
- 2. plane-ground propagation loss
- 3. spherical ground propagation loss
- 4. over-horizon propagation loss
- and etc.



7. Mechanism of reception

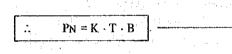
- 7-1 Thermal agitation noise (thermal noise) and effective noise power
 - 7-1-1- Every conductor with resistance emits electromotive voltage of thermal noise which is caused by thermal agitations of its internal free electoron.
 According to the Niquist's equation, this thermal agitation noise voltage is shown as below.

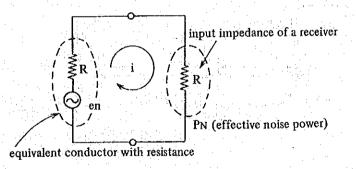


7-1-2 According to the equivalent circuit, the effective thermal noise power PN is given as the equation below.

(27)

$$PN = i^{2} \cdot R = \left(\frac{eN}{2R}\right)^{2} \cdot R = \frac{eN^{2}}{4R} = \frac{4 \cdot KTBR}{4R}$$
$$= K \cdot T \cdot B$$





7-1-3 As shown by the equation (27), the effective thermal noise power has no relation with the resistance value of the conductor.

7-2 Noise figure of a receiver and Carrier-to-noise ratio

7-2-1 If the receiving power was Pr at the input of the receiver of which gain is G and no internal noise, there was only a thermal noise power PN (= KTB) to be caused by its antenna system.

The carrier to noise ratio at input and output under the conditions above are shown as below:

C/N at input
$$(C/N)i = \frac{Pr}{KTB}$$

C/N at output $(C/N)o = \frac{G \cdot Pr}{G \cdot KTB}$
(28)

In this case there is no decrease of C/N because (C/N)i equals (C/N)o.

7-2-2 However there are some noises in fact, which are emitted and amplifiered by each of stages in the radio wave receiver, at its output.If the total noise power including these internal noise was called as Pn, the (C/N)o should

be shown as below.

$$(C/N)o = \frac{G \cdot Pr}{Pn} \quad (C/N \text{ at output, including internal noise}) \qquad (29)$$

7-2-3 The definition of the noise figure F is shown below.

$$F = \frac{(C/N)i}{(C/N)o} = \frac{\frac{Pr}{KTB}}{\frac{G \cdot Pr}{Pn}} = \frac{Pn}{G} \cdot \frac{1}{KTB}$$

$$F = \frac{(C/N)i}{(C/N)o} = \frac{Pn}{G} \cdot \frac{1}{KTB}$$
(30)

This noise figure F expresses the value of the internal noise of a receiver.

7-2-4 From the equation (30), the part Pn/G is shown as below.

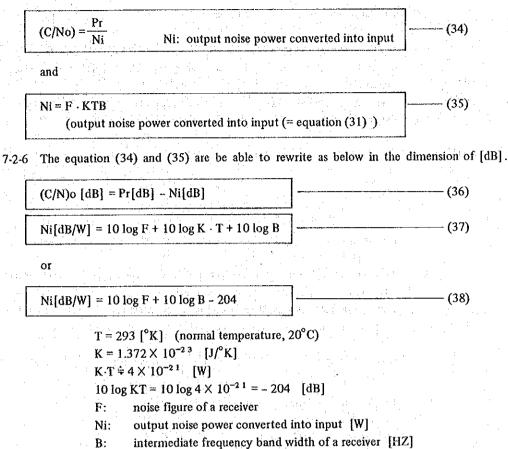
$$\frac{Pn}{G} = F \cdot KTB \text{ (output noise power converted into input)}$$
(31)
and

$$\mathbf{Pn} = \mathbf{G} \cdot \mathbf{F} \cdot \mathbf{KTB}$$
(32)

7-2-5 If the equation (32) was substituted into (29), the (C/N)o would be shown as below.

$$(C/N)o = \frac{G \cdot Pr}{Pn} = \frac{G \cdot Pr}{G \cdot F \cdot KTB} = \frac{Pr}{F \cdot KTB} = \frac{input \text{ carrier power (receiving power)}}{output \text{ noise power converted into input}}$$
(33)

01



Pr: receiving power (effective receiving power) [W]

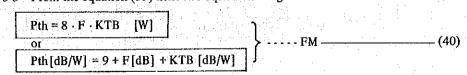
7-3 Threshold level (Threshold level for improvement of S/N)

- 7-3-1 In case of the frequency modulation, if the peak value of the carrier voltage was lower than that of the noise voltage, the carrier would not be detected, because it should be covered with the noise.The maximum input level of the detectable carrier is called Threshold level (Pth).
- 7-3-2 In this threshold point, the equation below is given, as the Peak Factor of thermal noise wave is 4 and that of carrier wave is $\sqrt{2}$.

$$\sqrt{2}\sqrt{\text{Pth}} = 4\sqrt{F \cdot \text{KTB}}$$
 (39)

FKTB: noise power converted into input using equation (31)

7-3-3 From the equation (39) next two equations are given.



7-3-4 In case of FM communication system, the equation (40) shows that the receiving power (receiving carrier power) should be more than 9 [dB] above the thermal noise power converted in to input which is shown by the equations (31), (35), (37) and (38). The equation below is also given by introducing Cf which is called the Crest Factor.

Det - OF E KTD (W)			((11)
$Ptn = CI \cdot F \cdot KIB [W]$		· .	(41)
The second se			

7-4 Signal-to-noise ratio (S/N)

- 7.4.1 The signal to noise ratio of the modulated carrier above the threshold level Pth is generally better than the carrier to noise ratio which are given as the equation (33) (34) and (36).
- 7.4.2 S/N to C/N ratio is called Improvement factor GI and shown as below. $G_{I} = \frac{\frac{S}{N}}{\frac{C}{N}}$
- 7-4-3 Improvement factor GI is not only the value which is fixed by the kind of the communication system and the performance of the receiver used, but also the value which is meaningless below the threshold level.

GI is also shown as the equation below using the dimension [dB]

$$GI = S/N [dB] - C/N [dB]$$

(42)

(43)

7.4.4 The improvement factor GI for the FM communication system is also given as the equations below.

$$G_{I} = \frac{3 \cdot fd^{2} \cdot B}{2 \cdot fm^{3}}$$
(44)
or
$$G_{I} [dB] = 10 \log 3 + 20 \log fd + 10 \log B - 10 \log 2 - 30 \log fm$$
(45)

- fd: frequency deviation [IIZ]
- fm: maximum modulation frequency [HZ]
- B: intermediate frequency band width [HZ]
- GI: improvement factor
- 7.4.5 In the case of the narrow-band FM system where fd = 5 KHZ, fm = 3 KHZ and B = 12 KHZ are used, the improvement factor GI is given as below.

$$G_{I} = \frac{3 \times (5 \times 10^{3})^{2} \times 12 \times 10^{3}}{2 \times (3 \times 10^{3})^{3}} = \frac{3 \times 25 \times 10^{6} \times 12 \times 10^{3}}{2 \times 27 \times 10^{9}} = \frac{900 \times 10^{9}}{54 \times 10^{9}} = 16.66$$

(For the narrow-band FM system)

 $G_1 [dB] = 10 \log G_1 = 10 \log 16.66 = 12.2 [dB]$

- 7-5 Signal to noise ratio for the threshold level
 - 7-5-1 S/Nth, the signal to noise ratio for the threshold level (just a little above the threshold level) is given as C/Nth · GI, the carrier to noise ratio multiplied by the improvement factor.

(46)

7-5-2 C/Nth, the carrier to noise ratio for the threshold level is given as the equations below using the Ni and Pth which are shown as the equations (35) and (41).

 $C/Nth = \frac{Pth}{Ni} = \frac{Pth}{F \cdot KTB} = \frac{Cf \cdot F \cdot KTB}{F \cdot KTB} = Cf$ C/Nth = Cfand (47)

$$C/Nth [dB] = 10 \log Cf = 10 \log 8 = 9 [dB]$$
 (48)

7.5.3 According to the paragraph 7-5-1 above, S/Nth, the signal to noise ratio for the threshold level is given as the equations below.

$$S/Nth = Cf \cdot G1$$
and
$$S/Nth [dB] = Cf [dB] + GI [dB]$$
(49)
(50)

7-5-4 According to the equations (46), (47), (48), (49) and (50), the signal to noise ratio S/Nth in the case of narrow-band FM system, is calculated as below.

S/Nth [dB] = Cf [dB] + GI [dB] = 9 + 12.2 = 21.2 [dB] ------ (51) (N-FM)

7-5-5 According to the equation (41), the threshold level in the case of narrow-band FM system, is also calculated as below where Cf = 8, T = 293 [°K] (normal temperature), K = 1.372 $\times 10^{-23}$, B = 12 [KHZ] and F = 9.5 [dB] are used.

 $Pth = Cf \cdot F \cdot KTB$

7-5-6 According to the equations (21) and (52), the threshold receiving voltage (stational) Vrth is calculated as below where Pr = Pth and $Rr = 50 \{\Omega\}$ are used.

Vrth
$$[dB/\mu] = Pth [dB/W] + 10 \log 50 + 120$$

= - 144.7 + 17 + 120
= - 7.7 $[dB/\mu]$ (53)

7-5-7 In the same way, the threshold receiving voltage (open) is calculated as below.

 $Vr_0 \text{ th } [dB/\mu] = P \text{ th } + 10 \log 50 + 126$ = - 144.7 + 17 + 126 = - 1.7 [dB/\mu]

7-5-8 These value expressed by the equations (51), (52), (53) and (54) are very useful to design the VHF communication circuits in the narrow-band FM system.

- (54)

7-5-9 The relation between the receiving power Pr and the signal to noise ratio is shown as the picture below in case of the narrow-band FM system.

