

REPUBLIC OF PARAGUAY

**CONSTRUCTION PROJECT
OF
EARTH STATION
FOR
SATELLITE COMMUNICATIONS**

Vol. III
PART IV ANNEX

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This report is one of the following three volumes:

- Volume I Planning Report
- Volume II Detailed Design
- Volume III Tender Document and Technical Specification
 - Part I General Instructions for Tender
 - Part II Contractual Terms and Conditions
 - Part III Technical Specifications for Supply and Installations of Communication Equipment
 - Part IV Annex

國際協力事業団

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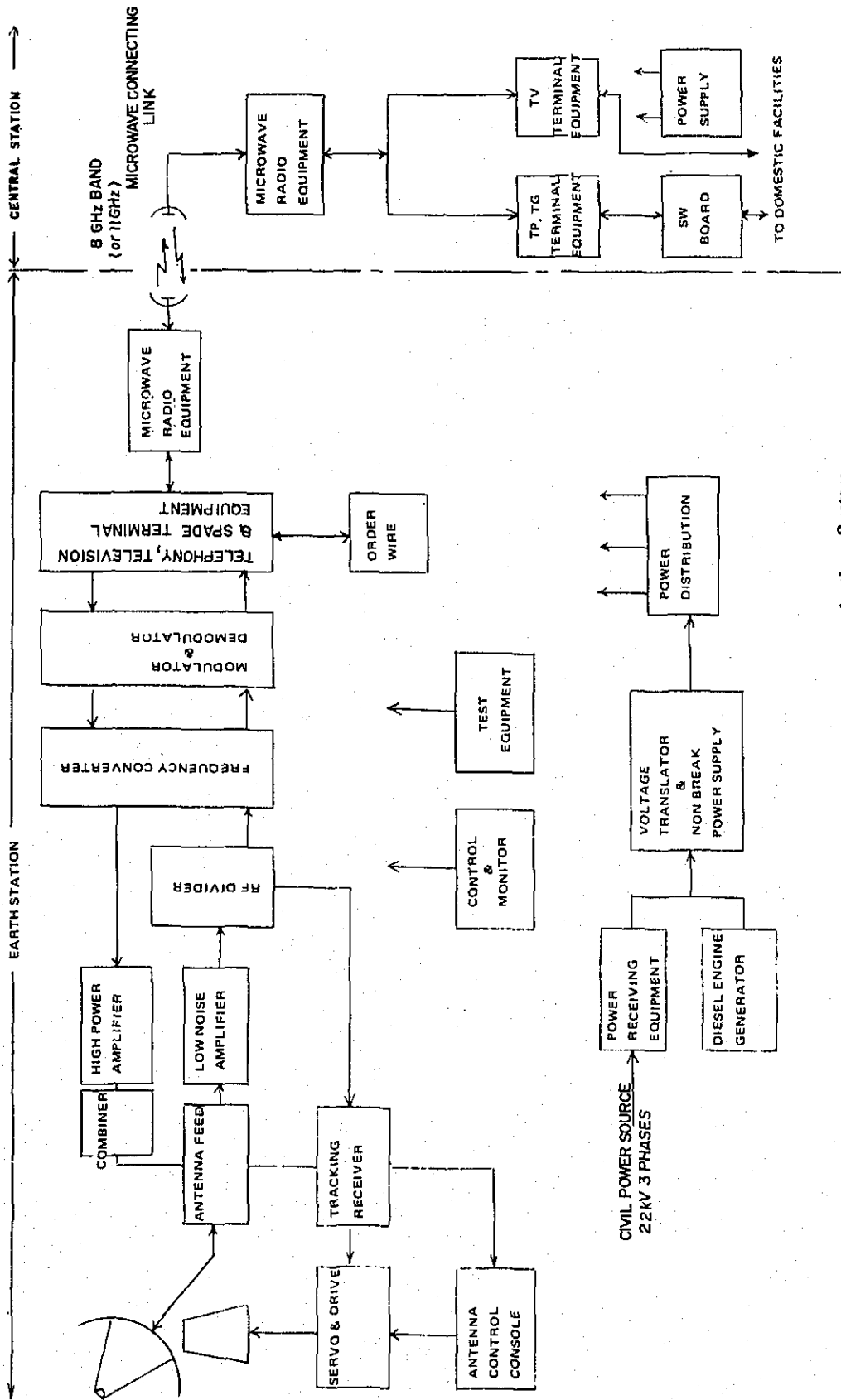


Fig. 1.1 Overall Blockdiagram of Satellite Communications System

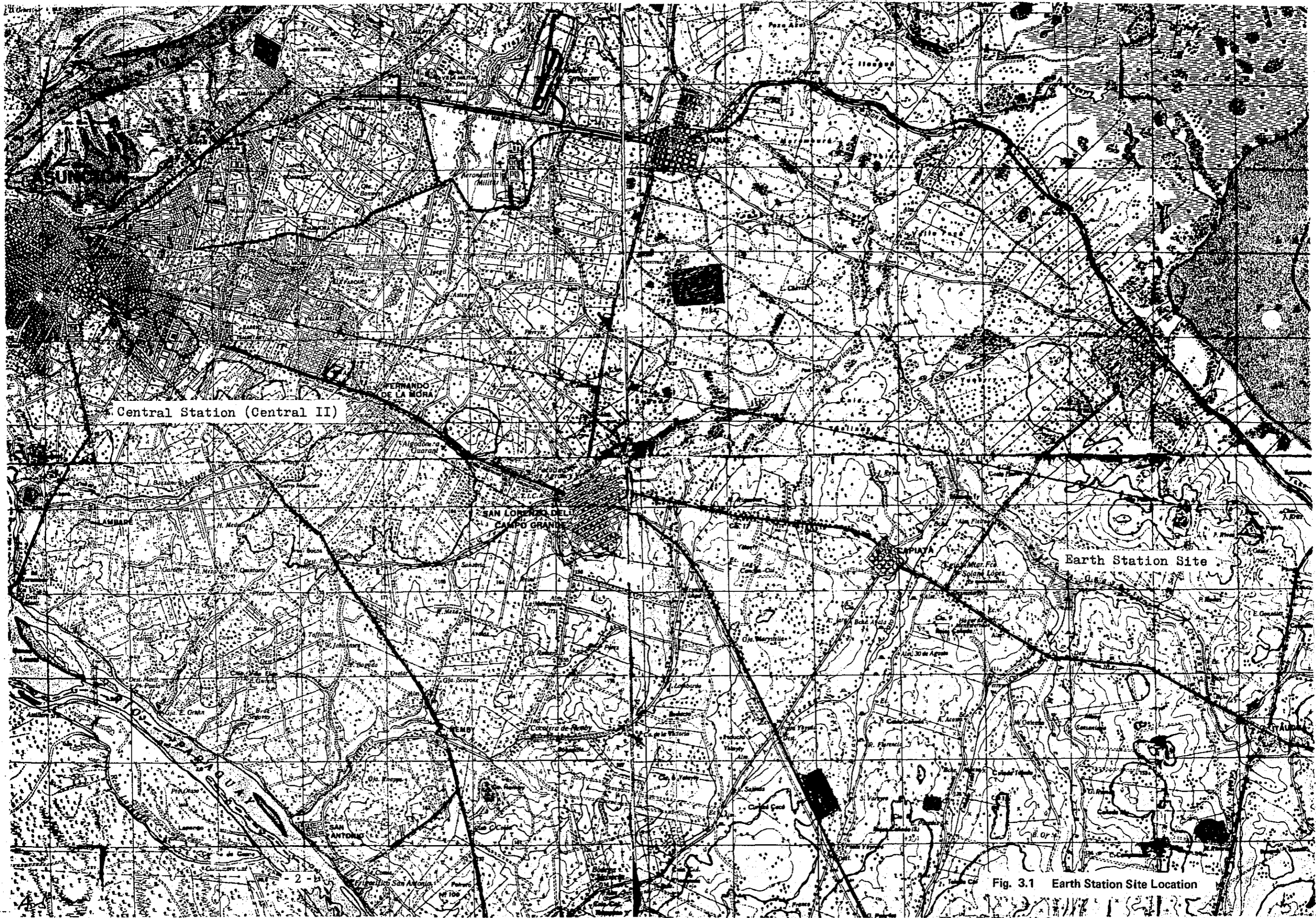


Fig. 3.1 Earth Station Site Location

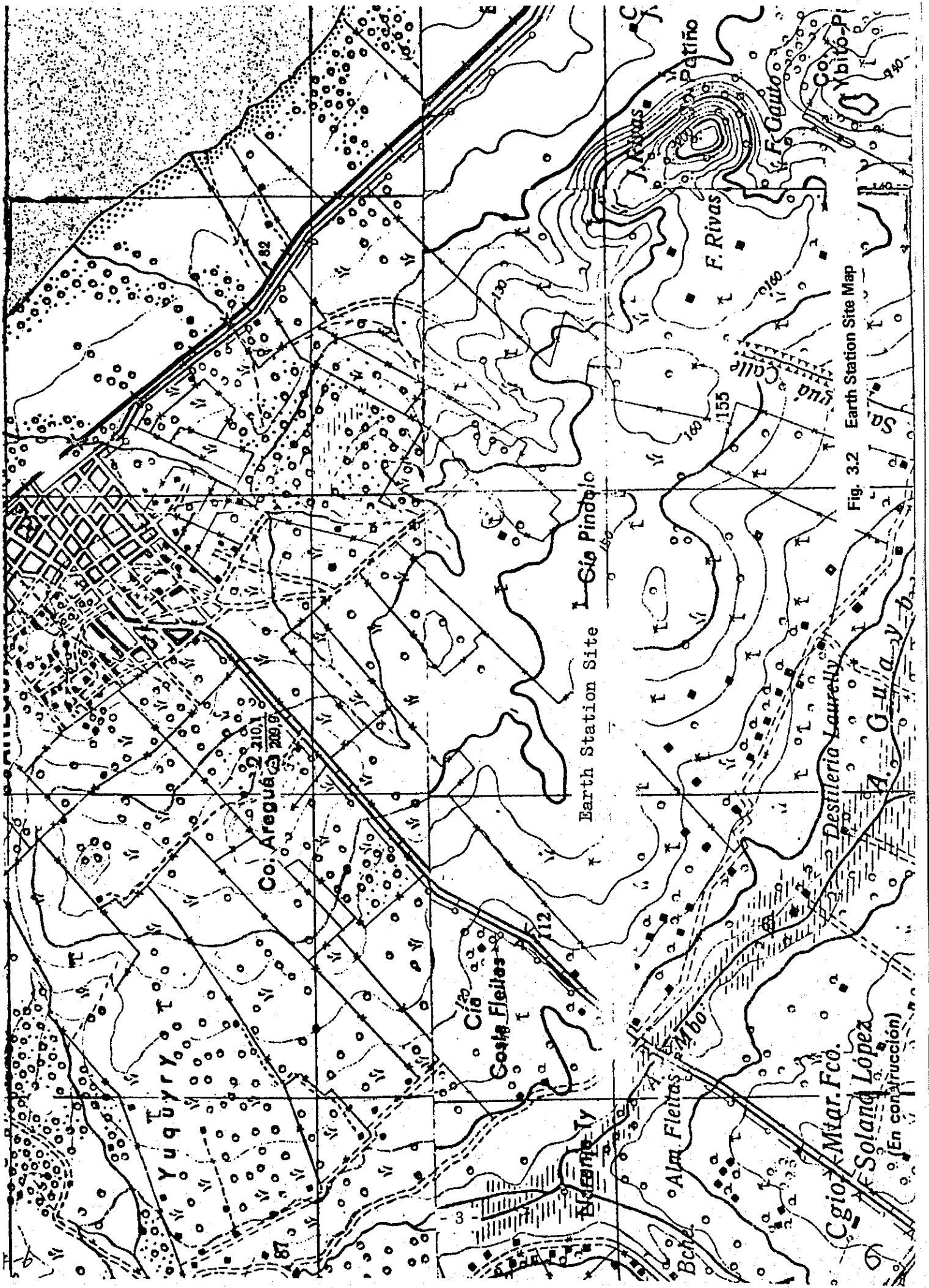


Fig. 3.2 Earth Station Site Map

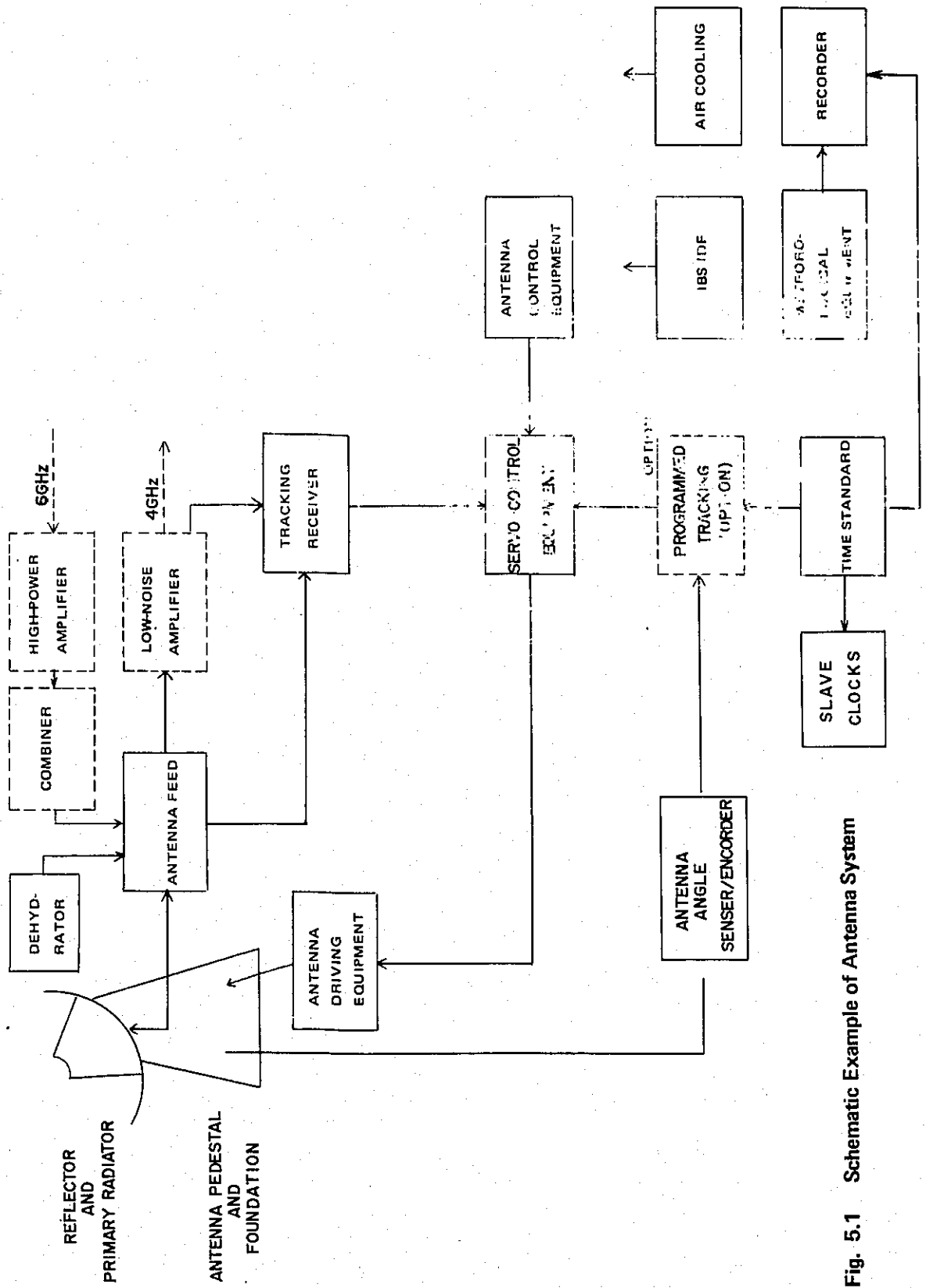


Fig. 5.1 Schematic Example of Antenna System

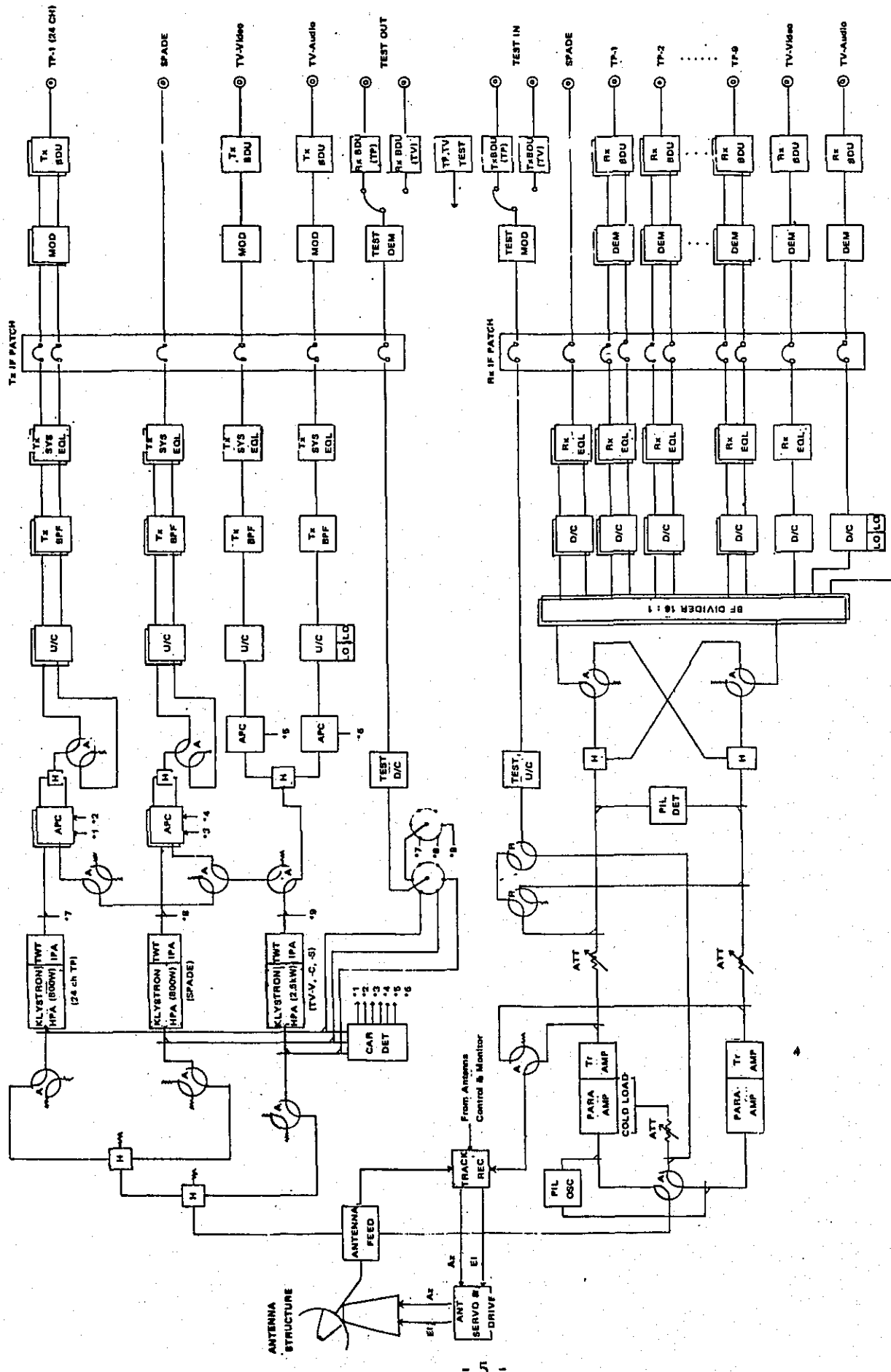


Fig. 5.2 Schematic Example of Transmitter and Receiver System

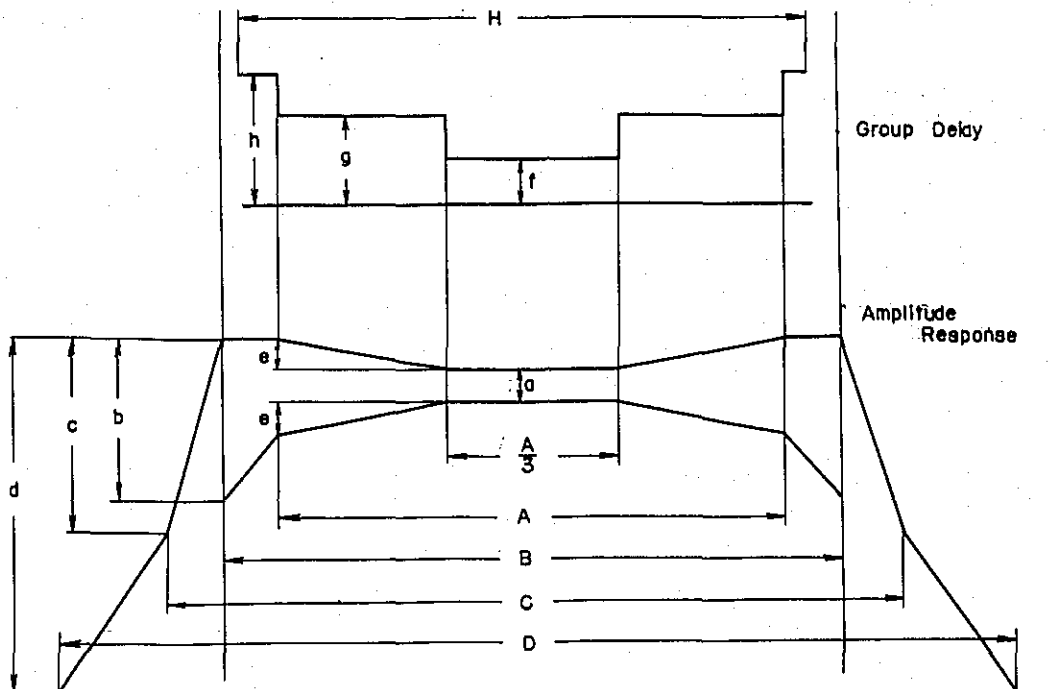


Fig. 5.3 IF to RF Amplitude and Group Delay Response

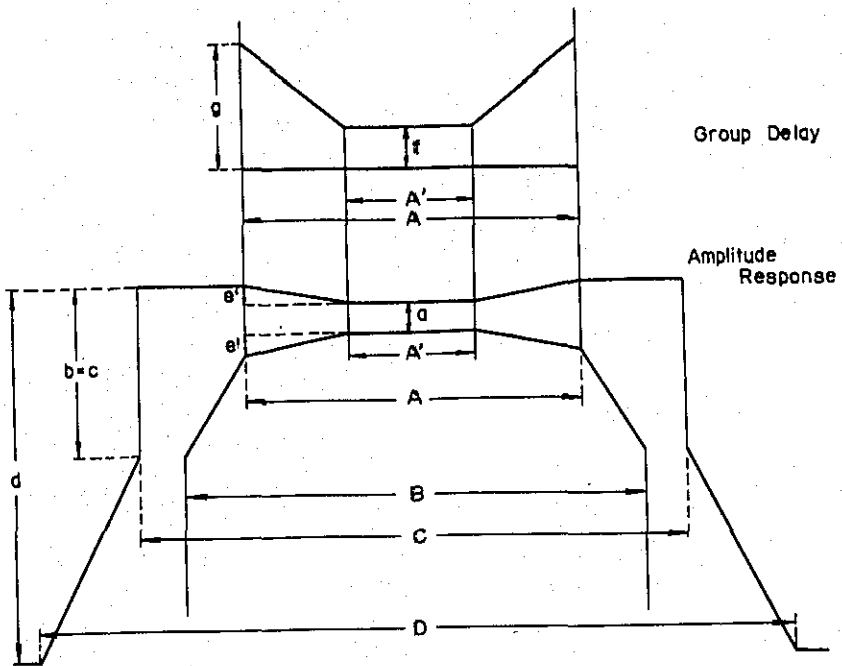


Fig. 5.4 RF to IF Amplitude and Group Delay Response

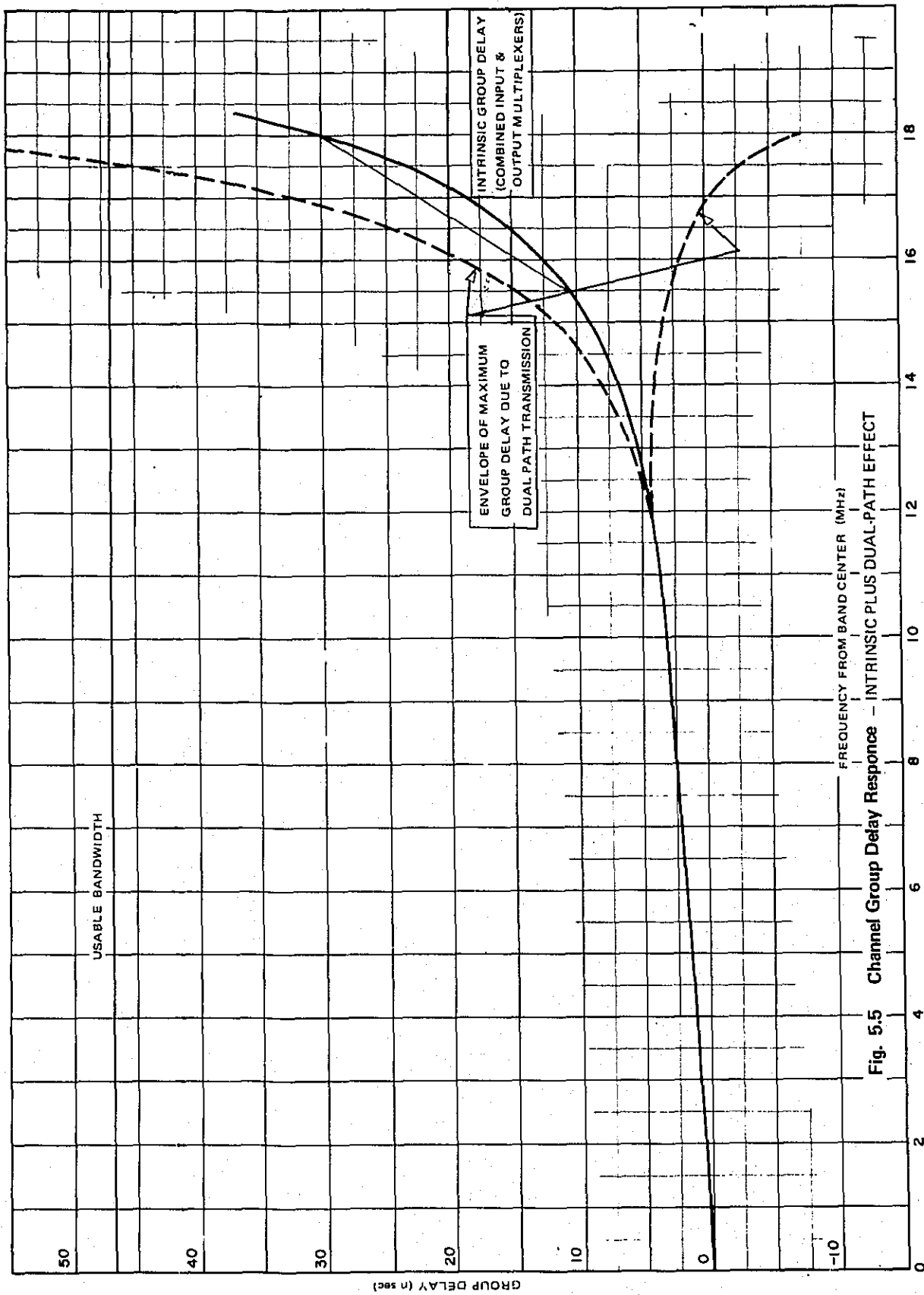


Fig. 5.5 Channel Group Delay Response - INTRINSIC PLUS DUAL-PATH EFFECT

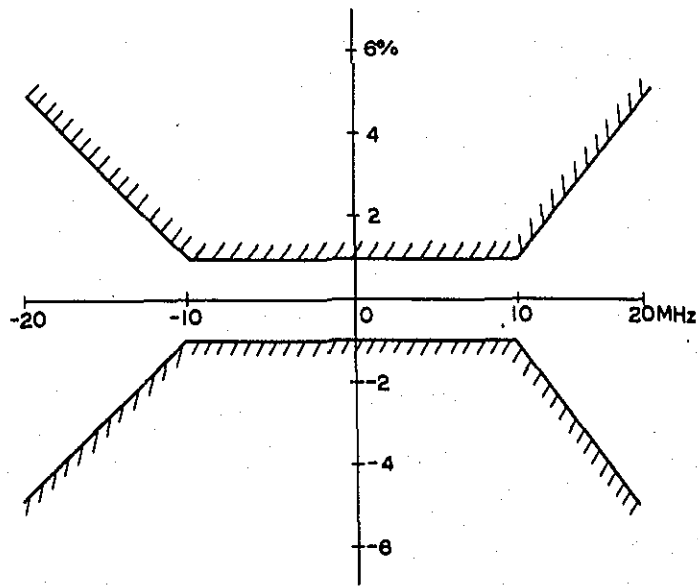


Fig. 5.6 Non-Linearity of FM Modulator

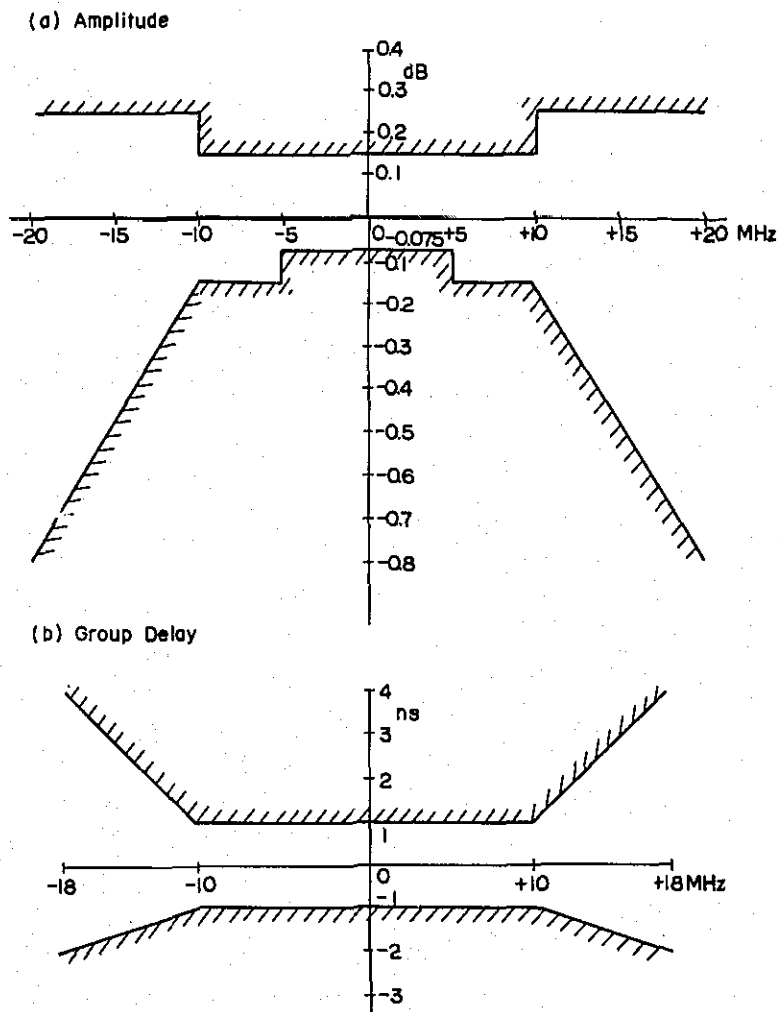


Fig. 5.7 Amplitude and Group Delay Response of FM Modulator

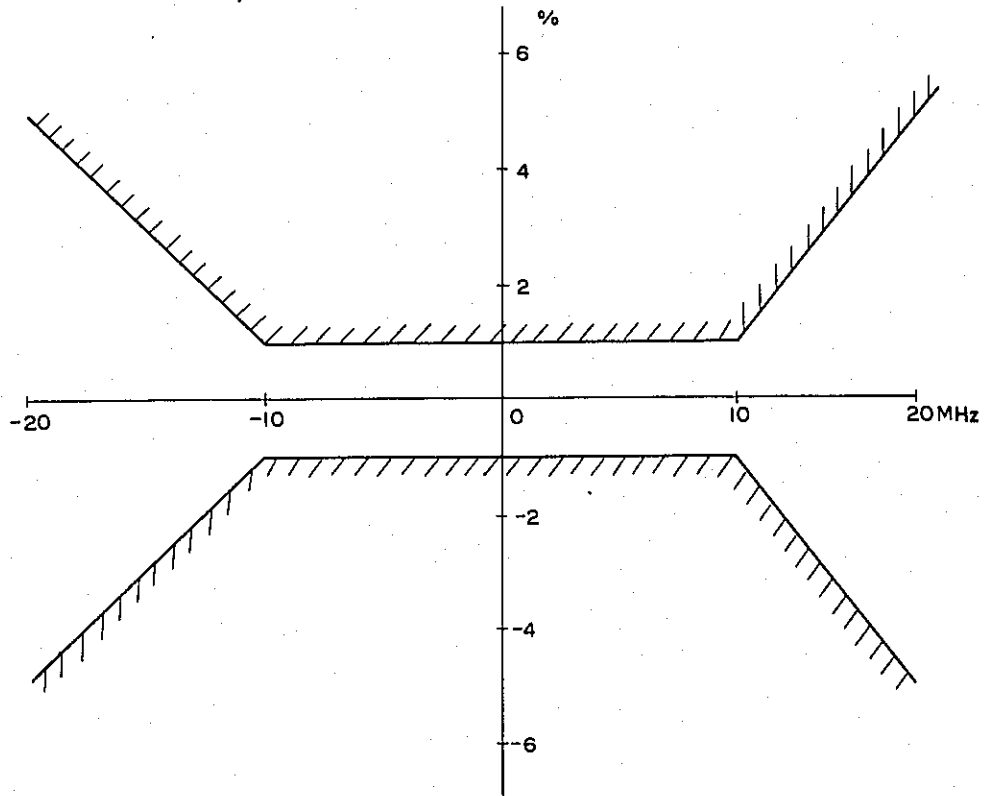


Fig. 5.8 Non-Linearity of FM Demodulator

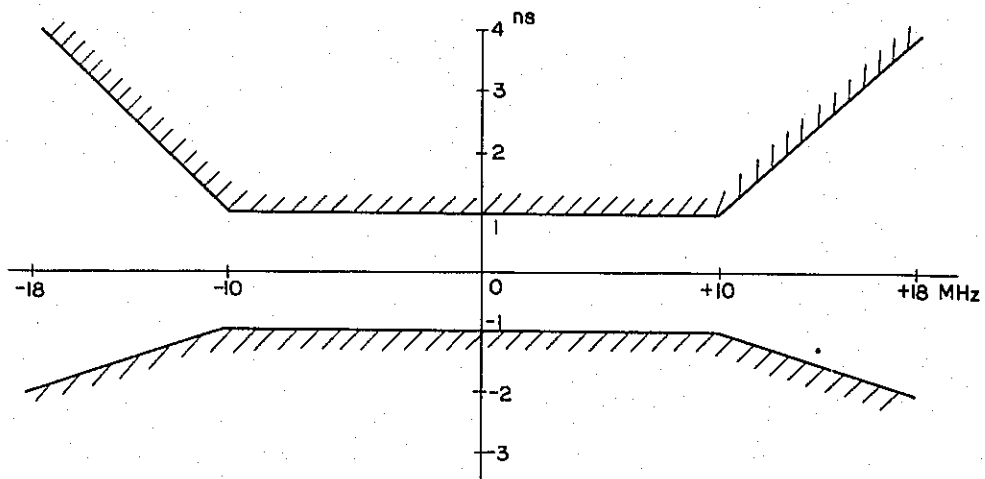


Fig. 5.9 Group Delay Response of FM Demodulator

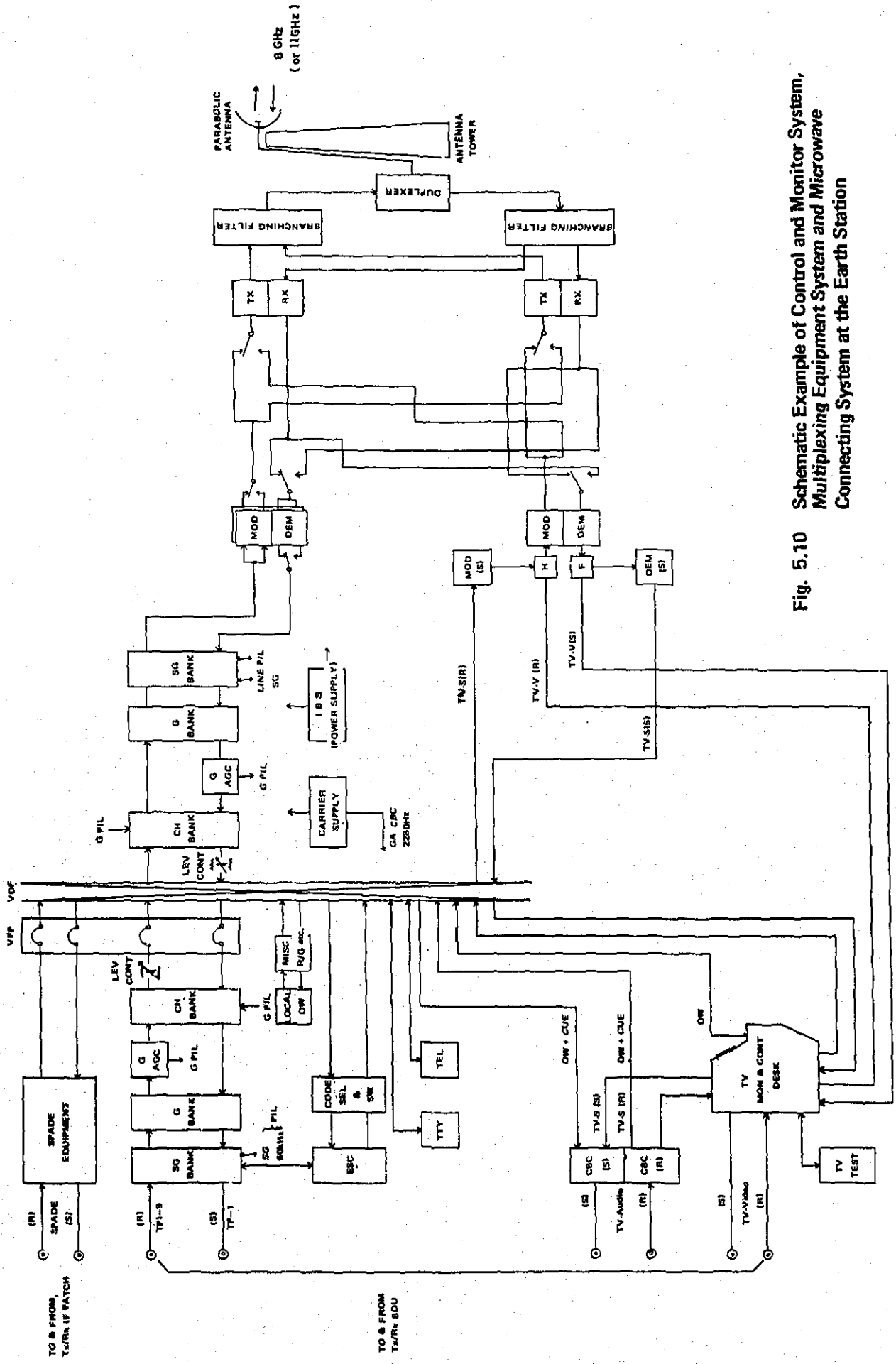


Fig. 5.10 Schematic Example of Control and Monitor System, Multiplexing Equipment System and Microwave Connecting System at the Earth Station

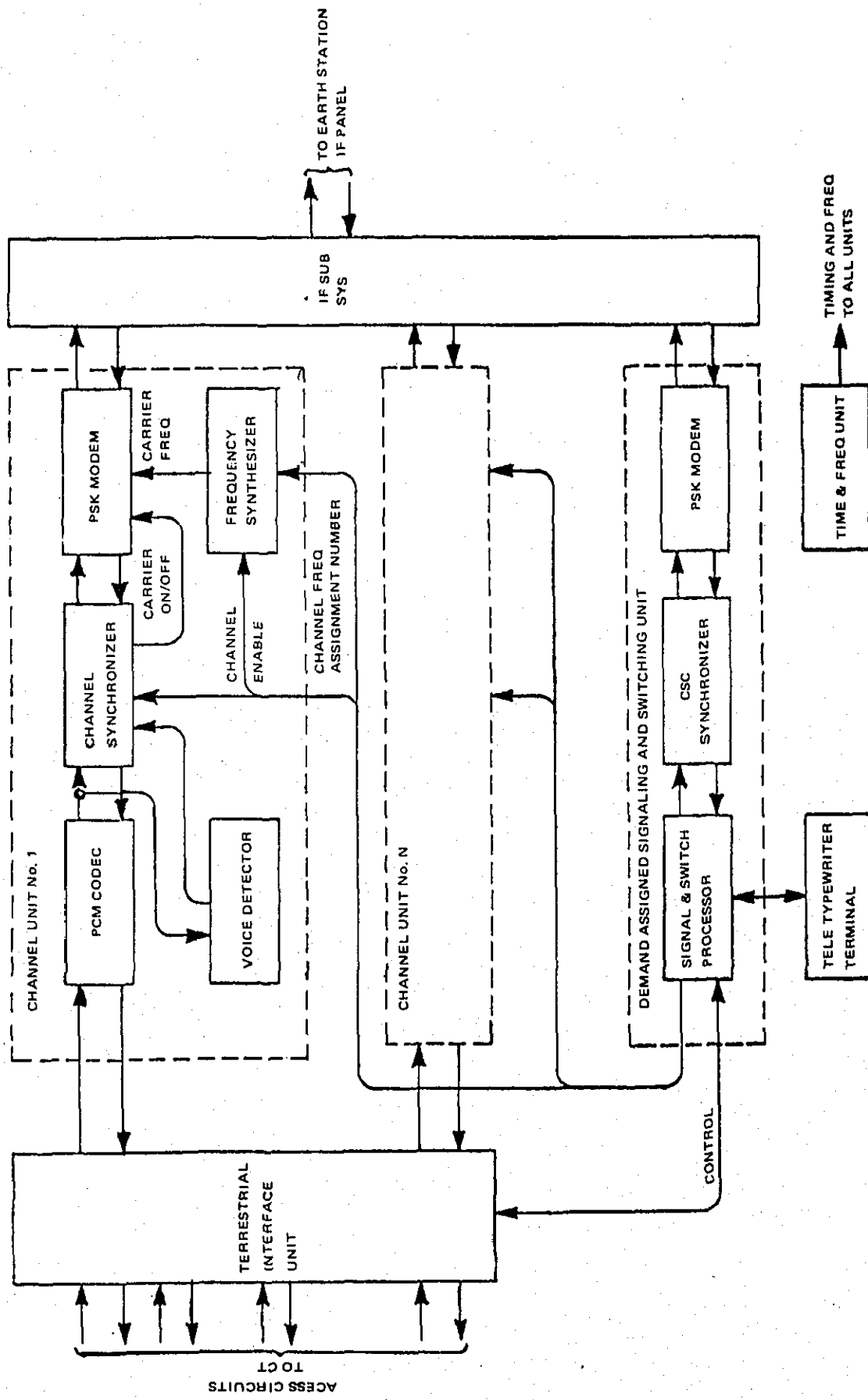


Fig. 5.11 Demand Assigned Terminal Functional Block Diagram

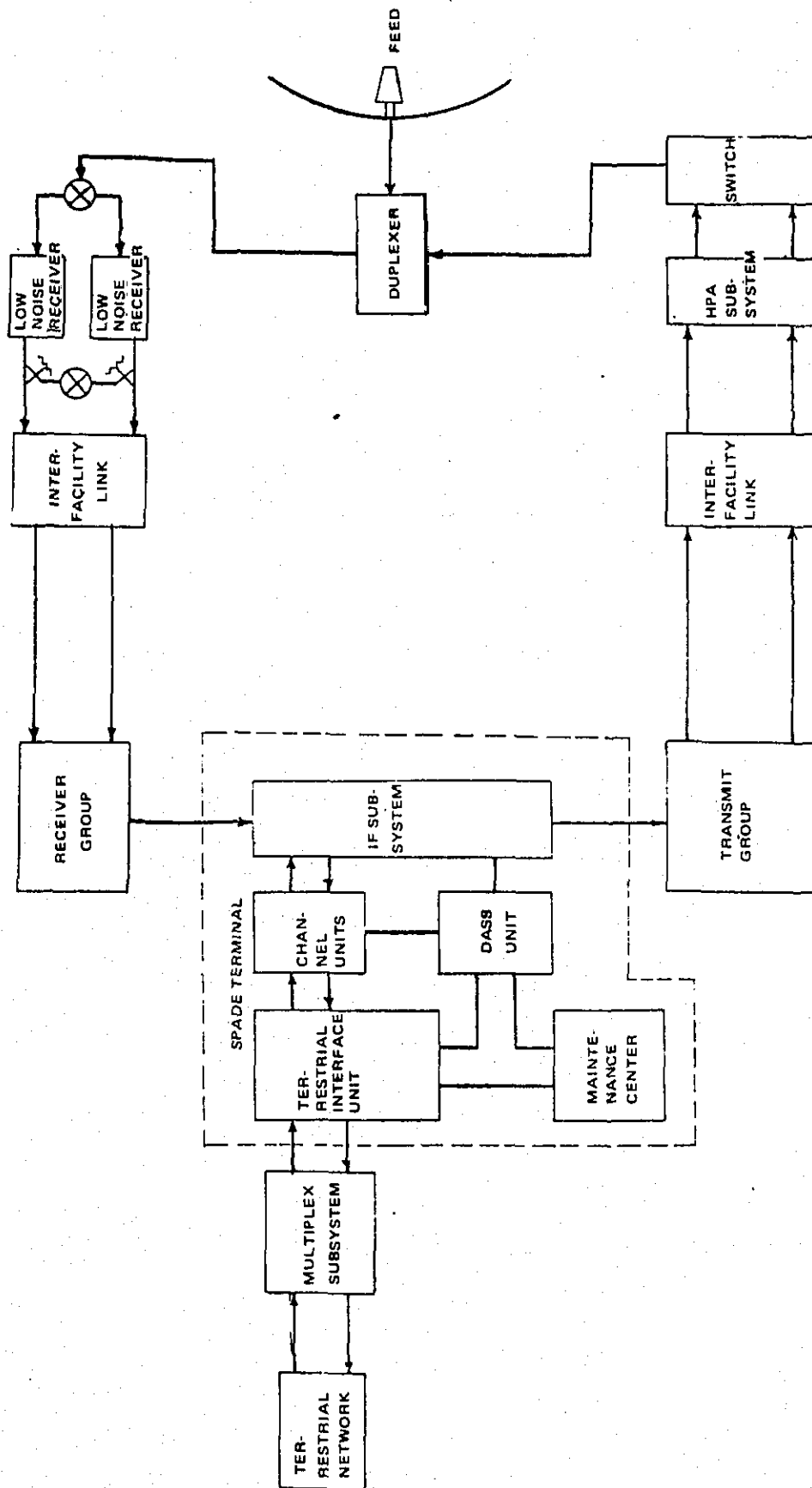


Fig. 5.12 Earth Station-SPADE Terminal Interfaces

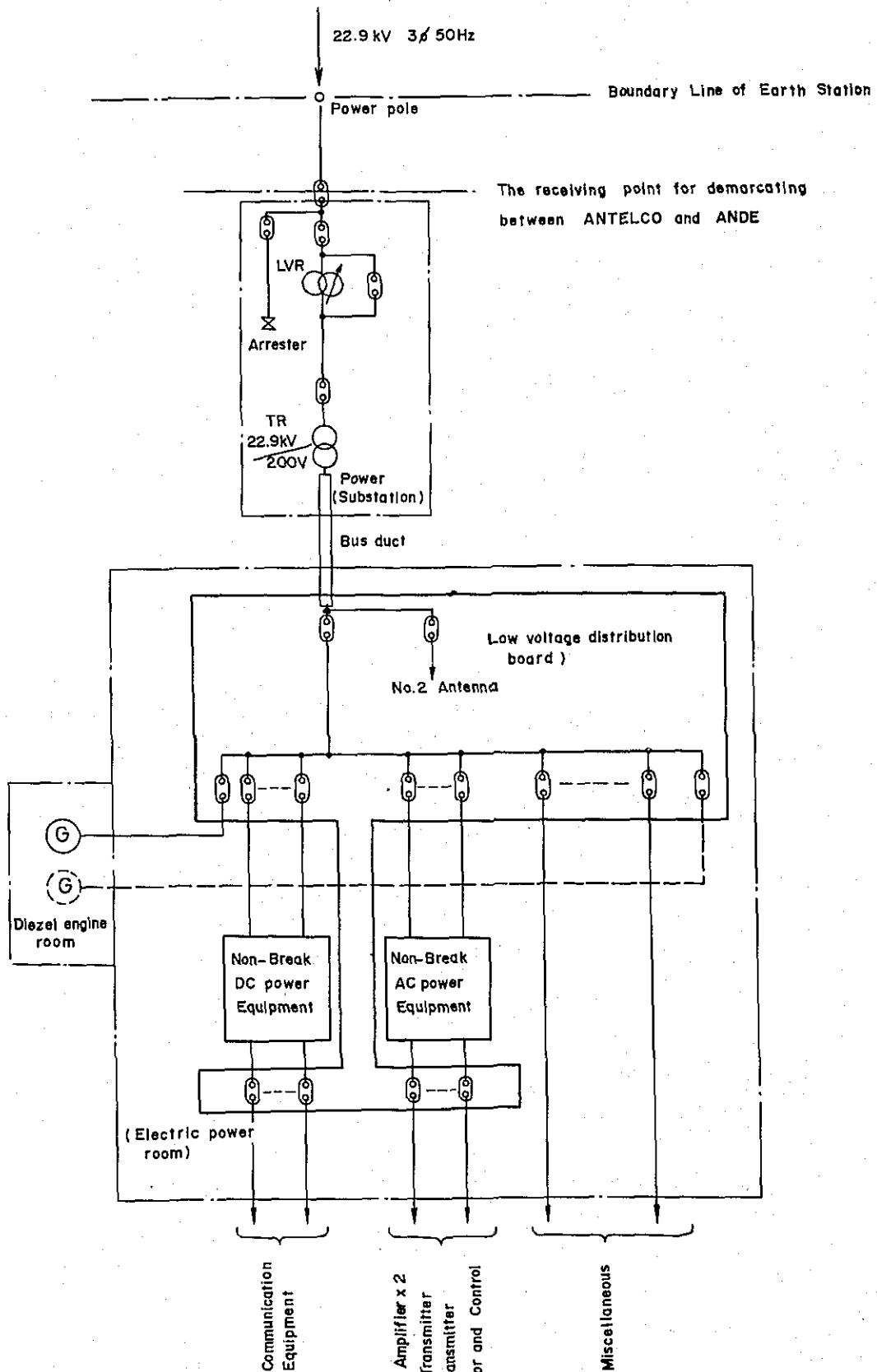
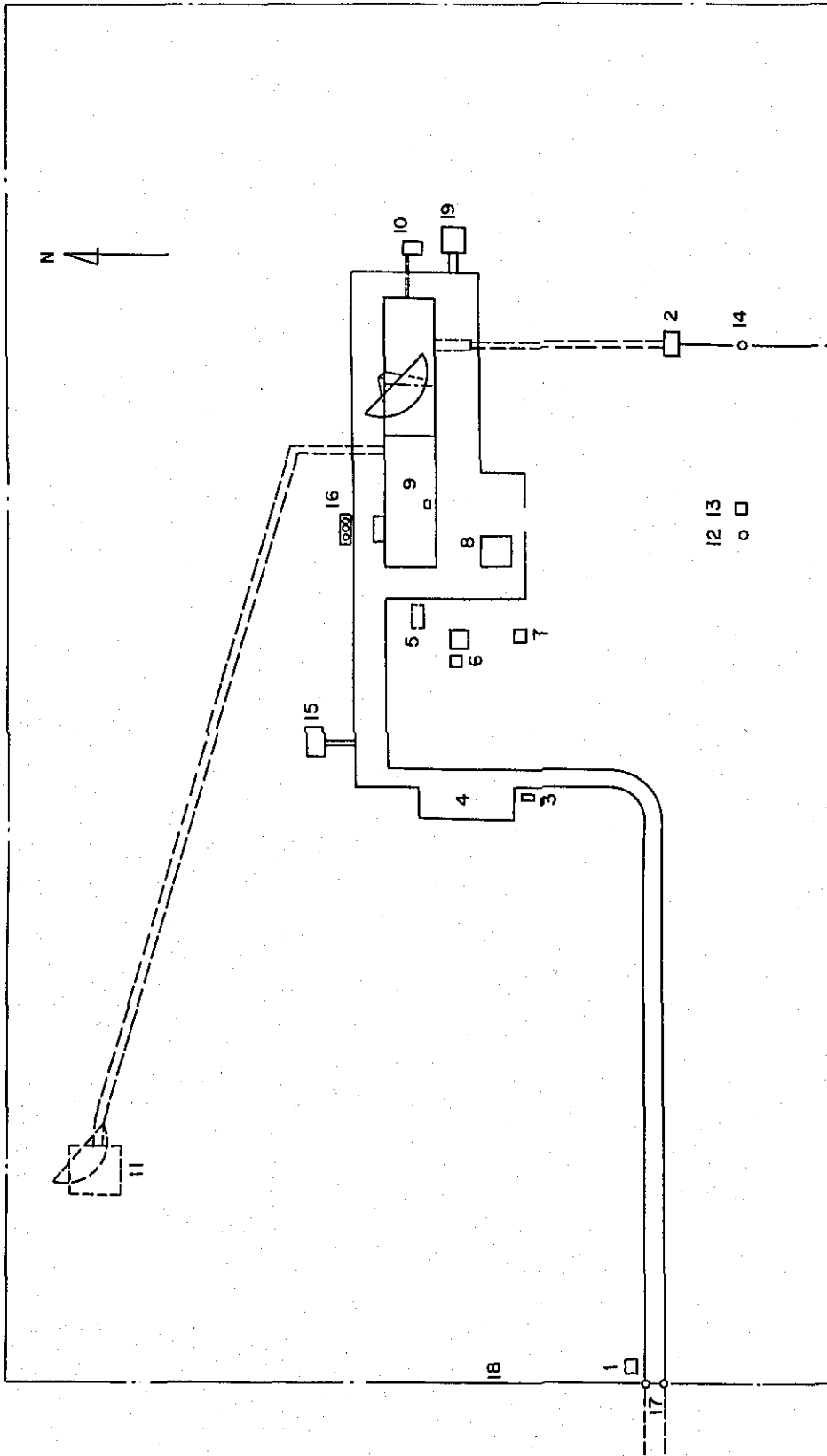
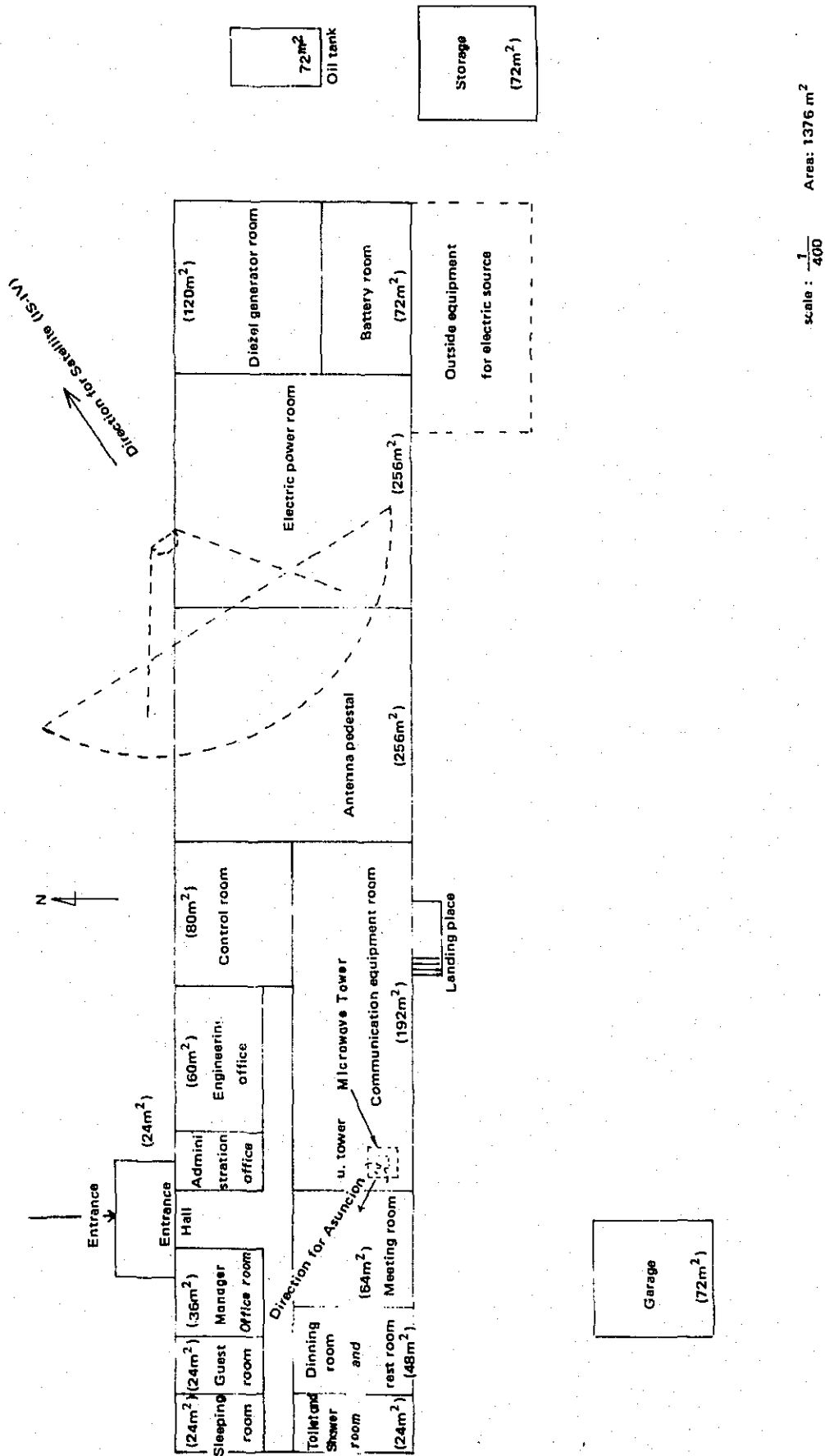


Fig. 7.1 Schematic Example of Power Equipment System for Earth Station



- | | | |
|--|---|--|
| 1. A Goto House | 8. A strage and garage | 14. Power pole |
| 2. A house for receiving commorcial source | 9. A main building | 15. An Official house of station manager |
| 3. A board for information | 10. An oil tank | 16. A Hoisting tower |
| 4. A parking place | 11. A place for installing antenna in the future | 17. A Guate |
| 5. A Drainage | 12. Motors for measuring wind dirrection and velocity | 18. A Fence |
| 6. A tank for supplying wator | 13. Weather instrument shutter | 19. A Storage for storing various oils. |
| 7. A fireplace for burning up | | |

Fig. 8.1 Layout of Facilities Arrangement



scale : $\frac{1}{400}$ Area: 1376m^2

Fig. 8.2 Layout of Earth Station Building

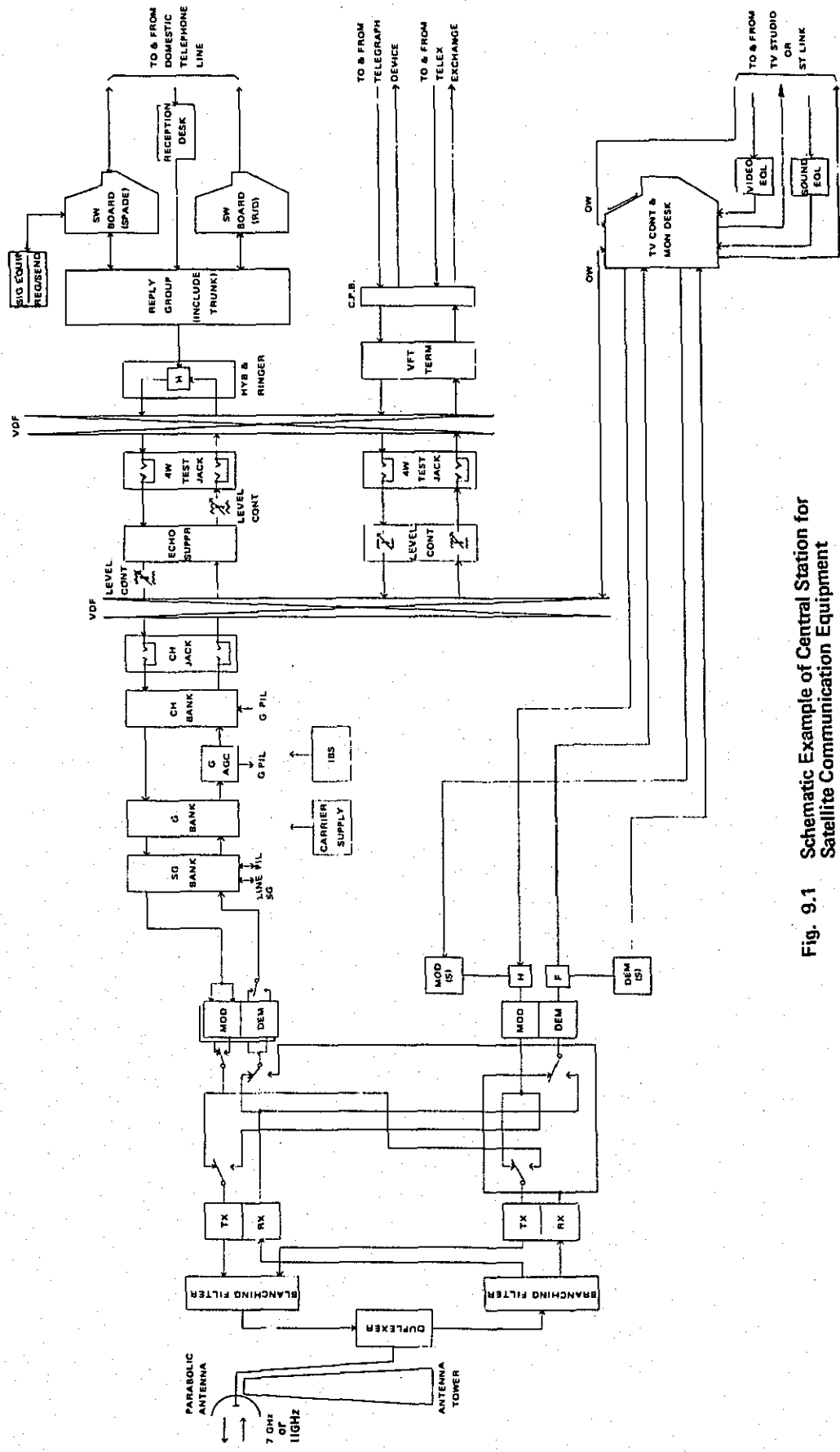


Fig. 9.1 Schematic Example of Central Station for Satellite Communication Equipment

k = 4/3

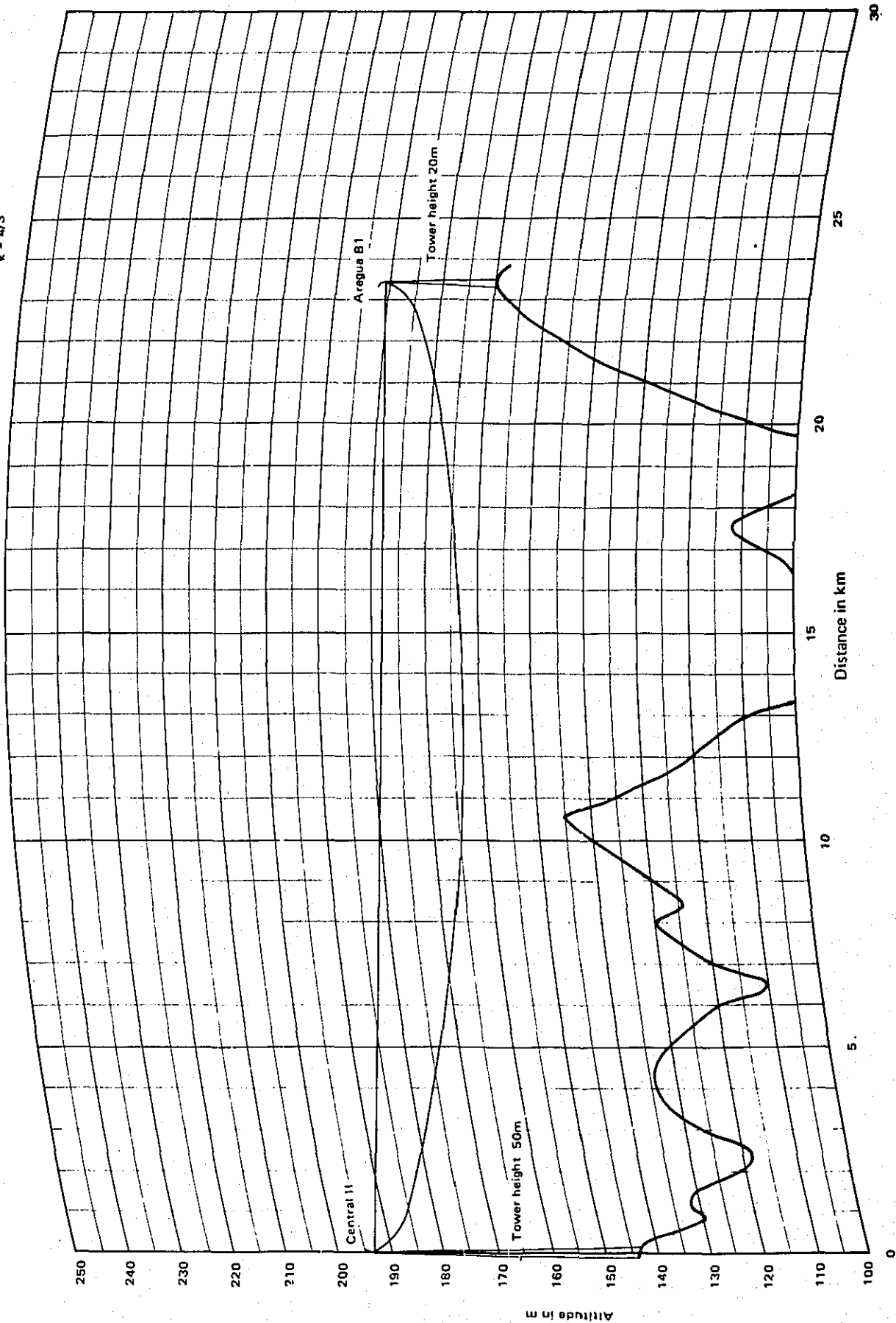


Fig. 9.2 Propagation Profile Between Central Station and Earth Station Site

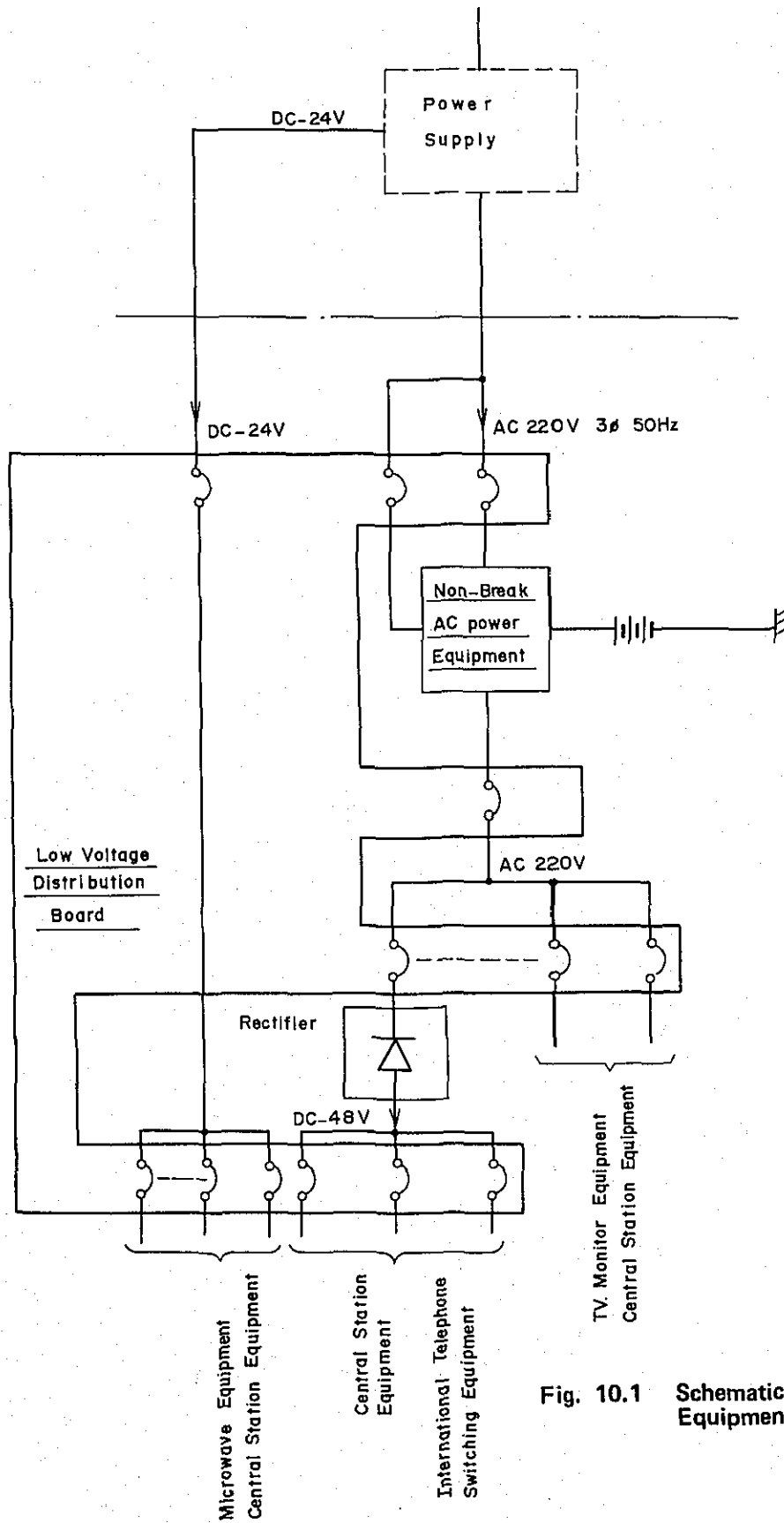


Fig. 10.1 Schematic Example of Power Supply Equipment for Central Station

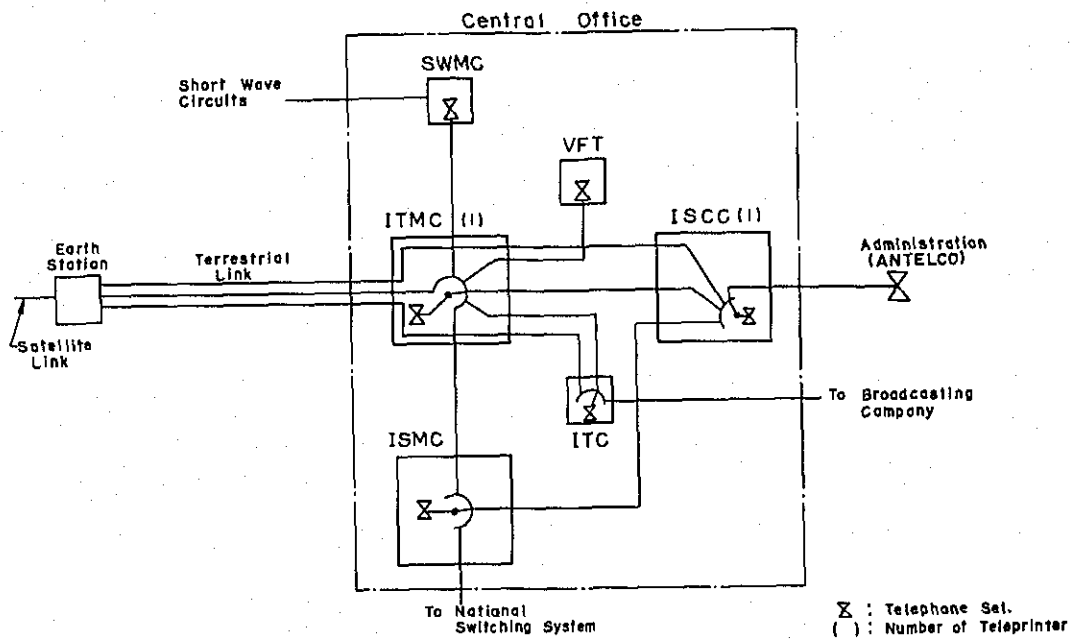


Fig. 10.2 Schematic Example of Order Wire System for Central Station

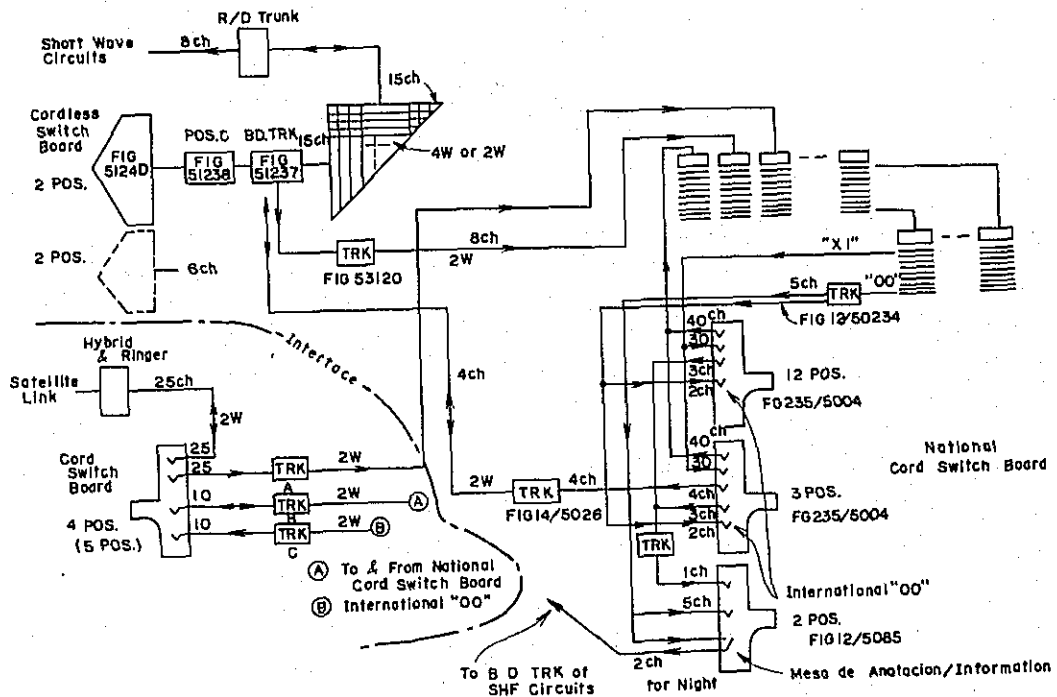


Fig. 11.1 Schematic Example of International Telephone Switch System

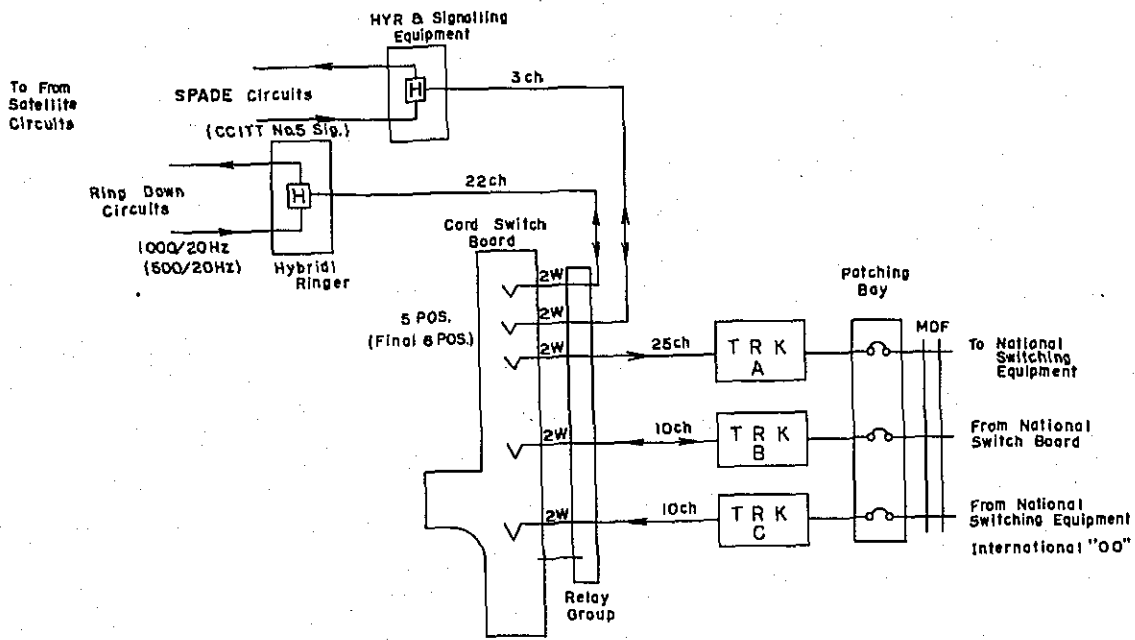


Fig. 11.2 Schematic Example of International Switching System for Cord Switch Board

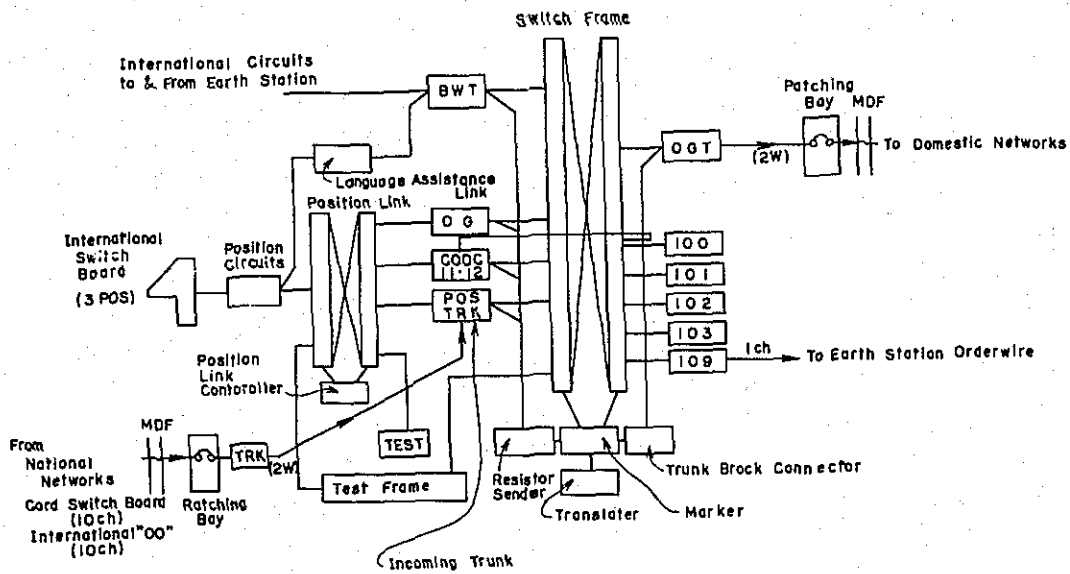


Fig. 11.3 Schematic Example of Trunking Diagram

Asuncion
Ref. 1 Record of Miscellaneous Meteorological Phenomena at ASUNCION
 Location: West longitude 56°30' South latitude 25°17'
 Above Sea Level: 139 m
 Statistic Years: 1941 - 1960

Item	1	2	3	4	5	6	7	8	9	10	11	12	Annual total of average
Atmospheric Pressure (mb)	1001.1	1001.6	1003.4	1006.6	1007.6	1008.8	1009.8	1007.9	1006.0	1004.6	1002.4	1001.2	1005.1
Absolute Maximum Temperature	41.8	40.8	39.9	35.8	33.0	32.0	32.6	38.0	39.1	39.1	39.5	41.2	41.8
Extreme Maximum Temperature	38.5	37.3	36.2	33.1	31.3	28.9	29.9	33.5	35.3	35.9	36.7	38.3	34.6
Maximum Mean Temperature	33.9	33.2	31.5	27.8	25.0	22.5	22.6	25.3	26.3	29.1	30.4	32.9	28.4
Mean Temperature	29.3	28.8	26.9	23.6	20.9	18.8	18.3	20.6	22.3	24.7	27.0	28.9	24.2
Minimum Mean Temperature	23.4	23.3	21.9	18.7	16.8	14.8	14.0	15.2	16.7	18.6	20.5	22.5	18.9
Extreme Minimum Mean Temperature	18.2	18.1	16.1	11.5	8.8	6.9	5.5	7.2	9.3	12.1	14.8	17.0	12.1
Mean Temperature Difference	14.8	14.0	11.5	6.4	3.9	2.5	2.5	2.3	3.9	9.0	12.0	13.1	2.3
Absolute Minimum Temperature	10.5	9.9	9.6	9.1	8.2	7.7	8.6	10.1	9.6	10.5	9.9	10.4	9.5
Mean Temperature Difference	18.2	16.5	16.8	17.9	16.5	16.3	16.8	19.7	18.2	19.4	19.0	18.2	19.7
Absolute Temperature Difference	18.3	18.6	17.3	14.7	13.2	12.3	11.3	11.4	12.6	14.4	15.5	16.2	14.7
Vaporization (Torr)	24.4	24.8	23.1	19.7	17.7	16.3	14.7	14.8	16.7	19.2	20.9	21.6	19.5
Vaporization (mb)	5	5	4	4	4	5	5	4	4	5	4	4	5
Average Cloudy Skies	167.4	142.1	159.5	138.0	131.2	86.7	54.0	30.3	87.0	145.5	128.5	121.8	1392.0
Average Precipitation	8	7	7	6	6	6	6	4	6	8	7	6	77
Reiny Days	0.05	0.05	0.05		0.1	0.05		0.3	0.4	0.4	0.1	0.05	1.5
Hail Days													
Frost Days	1.8	1.9	0.9	1.2	0.9	0.7	0.8	0.7	2.2	3.0	1.9	2.3	18.3
Magnetic Storm Days	1.1	0.6	0.7	0.6	0.3	0.2	0.1	0.5	0.9	1.1	1.2	1.3	8.6
Fine Days	2.9	1.8	3.8	6.2	6.9	4.5	7.0	9.0	7.0	4.9	4.7	5.5	64.2
Clean Fine Days	4.0	3.2	4.5	9.2	5.8	8.2	6.2	5.8	6.0	5.7	3.4	3.8	65.8
Cloudy Days	0.05	0.1	0.4	0.8	1.1	1.5	1.7	1.1	1.0	0.3	0.2	0.05	8.3
Fog	22	22	22	19	17	14	12	14	15	18	19	20	18
Dew Point	63	66	69	69	73	76	76	64	65	64	61	58	66
Relative Temperature (%)													

Economy Planning Agency, Republic of Paraguay



DIRECCION DE METEOROLOGIA

Ref. 2 Record of Storm Wind Direction and Velocity

A S U N C I O N

LAT: 25°17'06"

LONG: 57°39'10"

SEVA: 115.8 MTS

T O R M E N T A S D E V I E N T O O

P E R I O D O : 1933/69

F R E C U E N C I A M E D I A M E N S U A L Y A N U A L

E	F	M	A	M	J	J	A	S	O	N	D	ANUAL
1.01	0.70	0.53	0.61	0.32	0.20	0.19	0.68	0.78	1.22	1.13	1.25	8.68

F R E C U E N C I A M E D I A A N U A L P O R I N T E N S I D A D E N K M P . H .

50/61	62/74	75/88	89/102	103/117	118 y +	ANUAL
4.87	2.48	0.88	0.38	0.05	0.02	8.68

F R E C U A N C I A M E D I A A N U A L P O R D I R E C C I O N

N	NE	E	SE	S	SW	W	NW	ANUAL
0.58	0.41	0.26	0.72	0.38	2.36	0.48	0.49	8.68

NOTA: EN CLIMATOLOGIA SE CONSIDERA TORMENTAS DE VIENTO, CUANDO LA VELOCIDAD DEL VIENTO ES IGUAL O SUPERIOR A 50.- KM. P. H.-

Ref. 3 Record of Wind Direction and Maximum
Wind Velocity

FRECUENCIA MENSUAL Y ANUAL DE LA DIRECCION DEL VIENTO EN ESCALA 1000

LOCALIDADES	Periodo	CLM	N	NE	E	SE	S	SW	W	NW
SAN LORENZO	57/66	264	102	184	37	55	140	156	26	36
ASUNCION	39/66	131	57	193	232	130	177	50	14	16
CAACUPE	61/66	257	45	276	152	125	92	37	2	14

MAXIMA INTENSIDAD DEL VIENTO

LOCALIDADES	Periodo	Año	Mes	Direc.	Velocidad
SAN LORENZO	57/70	1967	E	SW	100 K.P.H.
"	"	1967	O	N	100 K.P.H.
ASUNCION	33/70	1953	F	NW	122 K.P.H.
CAACUPE	61/70	1963	JUN.	NE	65 K.P.H.
"	61/70	1963	S.	NE	65 K.P.H.

NOTA: La Institución no dispone de información de movimientos telúricos dentro del país, por no disponer el Servicio de Sismógrafo u otro instrumental registrador similar.-



Ref. 4 Record of Maximum, Minimum and Average Atmospheric Temperature

TEMPERATURA MEDIA MENSUAL Y ANUAL en °C.

LOCALIDADES	Perfodo	E	F	M	A	M	J	J	A	S	O	N	D	ANUAL
SAN LORENZO	61/68	27.4	26.8	24.9	22.0	19.2	17.3	17.0	19.1	20.3	23.5	25.7	27.3	22.5
ASUNCION	35/68	28.6	27.9	26.3	22.9	20.7	18.7	18.0	19.9	21.5	24.0	26.2	28.2	23.6
CAACUPE	61/68	25.8	25.3	23.7	21.3	18.9	17.1	16.8	18.9	19.8	22.4	24.3	25.9	21.7

TEMPERATURA MAXIMA ABSOLUTA °C

SAN LORENZO	57/68	40.1	40.0	39.7	36.1	33.0	31.0	32.0	36.1	38.5	40.7	40.3	40.6	40.7
ASUNCION	29/68	42.0	40.8	40.0	36.7	33.5	32.9	33.0	38.7	39.1	40.3	39.9	41.9	42.0
CAACUPE	61/68	39.0	37.5	38.0	35.0	31.5	30.5	30.0	35.5	37.0	39.0	38.5	39.5	39.5

TEMPERATURA MINIMA ABSOLUTA °C

SAN LORENZO	57/68	10.5	11.4	7.3	4.7	-1.6	-0.7	-1.2	-2.7	1.7	5.6	8.1	12.0	-2.7
ASUNCION	29/68	14.8	14.0	10.0	6.4	3.9	1.5	2.5	1.2	3.9	9.0	10.2	13.1	1.5
CAACUPE	61/68	13.0	12.0	7.0	5.0	3.2	-1.0	-3.5	-1.5	2.0	7.5	10.5	12.0	-3.5



Ref. 5 Record of Humidity and Precipitation

LOCALIDADES	Perfodo	HUMEDAD RELATIVA												
		E	F	M	A	M	J	J	A	S	O	N	D	ANUAL
SAN LORENZO	61/68	69	73	75	78	80	78	77	72	73	68	67	67	73
ASUNCION	61/68	63	68	70	72	74	77	72	65	66	64	62	60	68
CAACUPE	61/68	69	73	74	76	77	75	74	69	72	65	67	67	72

PRECIPITACION MEDIA MENSUAL Y ANUAL EN mm.

LOCALIDADES	Perfodo	PRECIPITACION MEDIA MENSUAL Y ANUAL EN mm.												
		E	F	M	A	M	J	J	A	S	O	N	D	ANUAL
SAN LORENZO	57/66	153	147	222	99	84	55	59	120	137	177	197	197	1.661
ASUNCION	41/66	160	148	184	165	121	80	47	35	80	221	136	130	1.409
CAACUPE	61/66	154	198	178	175	109	80	44	48	78	120	161	191	1.536

HELADAS

En la Zona comprendida entre Luque y San Lorenzo, el promedio de heladas al año es de 1.00, y su máxima intensidad registrada fué de -2.7°C . en San Lorenzo.

