CHAPTER 10
PROJECT COST ESTIMATION

CHAPTER 10 PROJECT COST ESTIMATION

10-1 Construction Cost

The construction cost is detailed in Table 10-1. The cost classification into local currency and foreign currency portions is based on Paragraph 9-1: Equipment Procurement Methodology. This cost estimate is presented at the presumed price level as of 1984.

10-1-1 Switching Equipment, Power Supply Equipment

The switching equipment cost is estimated on the assumption that all equipment be the stationary type. The power supply equipment cost does not include the cost of the equipment for power supply to the transmission and radio equipment.

In case where the switching equipment and the transmission/radio equipment are installed in the same exchange building, it must be noted that the supply voltages to the two equipment categories differ (48 V and 24 V). Because of this, two supply systems will be used beyond the rectifier stage. This cost estimate covers the 48 V supply system to the switching equipment.

10-1-2 Subscriber Cable Facilities

This cost item applies to the construction of subscriber cable facilities in the service areas of 12 exchange offices to be newly established by this Project. The telephone set cost includes the new subscriber's premise work cost (approximately 5% of the total telephone sets).

10-1-3 Transmission System Facilities

This cost item includes the cost of cable transmission facilities between the radio terminal office and the switching office and the cost of drop wire (or cable) facilities to the remote subscriber telephones.

Also included in this cost item is the cost of power supply equipment to the transmission and radio equipment.

10-1-4 Building and Access Road

This construction work is to be done by ENTEL. The cost estimate is made in the local currency portion.

10-2 Maintenance and Operation Cost

The maintenance and operation cost comprises all necessary expenses for maintenance and operation of equipment installed, as well as the cost of training of personnel to assume maintenance and operation duty.

Table 10-1 Project Cost

	Foreign Currency		Local Currency
	Thousand Japanese Yen	Equivalent Thousand US$	Thousand Peso Boliviano
1. Equipment Work Portion			
1) Switching Plant	1,875,900	8,530	11,470
2) Outside Plant	1,046,400	4,750	171,290
3) Transmission Plant	3,809,600	17,320	71,220
4) Total	6,731,900	30,600	253,980
2. Civil Work Portion			
1) Building	-	-	30,920
2) Access Road	-	-	50,550
3) Total	-	-	81,470
3. Consultancy Service	396,560	1,800	11,040
4. Basic Project Cost	7,128,460	32,400	346,490
5. Contingency (10%)	712,850	3,240	34,650
6. Total Project Cost	7,841,310	35,640	381,140

Note:

1) Exchange Rate: 1 US Dollar = 220 Japanese Yen
1 US Dollar = 24.5 Peso Boliviano

CHAPTER II
ECONOMIC EVALUATION

CHAPTER 11 ECONOMIC EVALUATION

11-1 Financial and Economic Analysis

11-1-1 Background of the analysis

(1) General Remarks

This chapter makes the feasibility study with regard to the investment in the telephone network improvement and expansion project of the Republic of Bolivia. The study is made from the financial and economic viewpoints.

Out of the whole project, the target works of investment, this time, are

1. Subscriber's premise facilities;
2. Subscriber cable facilities;
3. Local and toll switching facilities;
4. Toll transmission facilities.

These construction works are essential for the system-wise completion of the subscriber line replenishment plan up to the end of 1990.

The investment feasibility study comprises six phases. They are:

1) To formulate the ways and means program for ENTEL as the project management entity to finance the project implementation.

2) To estimate the financial internal rate of return of the project by means of analysis of the profit ratio of total liabilities and net worth, and to study the earning power of the project in relation to the project loan repayment.

3) To estimate the net profit to net worth ratio of the project investment and to study the net worth creation capability of ENTEL.

4) To make costs-benefits analysis and thereby estimate the economic internal rate of return of the project. More precisely, to investigate the fundamentals of Bolivian economy and to make the frontier base conversion of value of the project investment mainly aimed at the internal economy and then re-evaluate the project investment from the viewpoint of national economy.

5) To make recommendations to ENTEL with regard to its system operation up to the year 2000 after the completion of this project.

6) To clarify the project investment impact on the development of Bolivian economy from the social and economic viewpoints.

Based on the findings in the analysis of the foregoing 1) through 6) items, the economic feasibility study of the project investment is made.

Data used in such analysis, including data about initial investment and operating cost and revenue, are restricted to those relating to the project concerned. Such data are either quoted from the information presented hereafter or estimated from such information.

Following are the sources of social and economic information used in this analytical study:

1. SINTESIS EXPLICATIVA DEL CASH FLOW 1981 by ENTEL

2. BANCO CENTRAL DE BOLIVIA MEMORIA ANUAL GESTION 1980

3. BOLIVIA EN CIFRAS 1980 INSTITUTO NACIONAL DE ESTADISTICA

4. BOLETIN ESTADISTICO NO241 MARZO 1981 DIVISION TECNICA

5. PROGRAMA TRIENAL DE GOBIERNO DE LAS FF. AA. DE LA NACION LAPAZ OCT. 1981

6. BOLIVIA, ESTUDIO DE LA POBLACION ECONOMICAMENTE ACTIVA A NIVEL DE PARTAMENTAL SEGUN EL CENSO DE 1976, CON ALGUNAS COMPARACIONES INTERCENSALES

7. BOLETIN ESTADISTICO TRIMESTRAL 1 SEPTIEMBRE 1981

8. INDICADORES ECONOMICOS DE CORTO PLAZO LAPAZ OCTUBRE DE 1981 BANCO CENTRAL DE BOLIVIA, DIVISION TECNICA DEPARTAMENTO DE CUENTAS NACIONALES NO 2

9. ESTADISTICAS DE TRANSPORTES Y COMUNICACIONES 1975-1979 MINISTERIO DE PLANIEAMIENTO Y COORDINACION INSTITUTO NACIONAL DE ESTADISTICA

10. VALOR BRUTO DE LA PRODUCCION AGROPECUARIA 1980-1981 CAMARA AGROPECUARIA DEL ORIENTE

11. RESUMEN DEPARTAMENTAL DE DATOS FINALES DEL CENSO GANADERO 1978

12. DATOS ESTADISTICOS DE EAFRA CORRESPONDIENTE AL PRESENTE ANO

13. INFORME DE LABORES DEL DIRECTORIO NOV 1980 UNION AGROINDESTRIAL DE CANEROS S.A.

14. SUGERENCIAS PARA UNA FABRICA DE A ECAR

15. EL MUNDO DEPORTES SANTACRUZ DE LA SIERRA, BOLIVIA
    JUEVES 3 DE SEPTIEMBRE DE 1981
    DOMINGO 8 DE NOVIEMBRE DE 1981

16. GUIA DE INDUSTRIA Y COMERCIO DE SANTACRUZ - BOLIVIA

17. DECISION 24 REGIMEN COMUN DE TRATAMIENTO A LOS CAPITALES EXTRANJERES Y SOBRE MARCAS, PATENTES, LICENCIAS Y REGALIAS JUNTA DEL ACUERDO DE CARTAGINA

18. CAMARA AGROPECUARIA DEL ORIENTE; AYUDA MEMORIA

19. CAMARA DPTAL DE INDUSTRIAL DEL-SECTOR-METALMECANICO

20. MAQUINAS HERRAMIENTAS EN BOLIVIA PROYECTO INTEGRAL DE DESARROLLO

21. MODIFICACIONES AL DECRETO LEY 14803 MINISTERIO DE INDUSTRIA, COMERCIO Y TURISMO

22. TRAFICO TELEFONICO INTERNACIONAL
    VALORES REPRESENTATIVOS POR MES

23. NO 1113 GACETA OFICIAL DE BOLIVIA

24. FUE APROBADA NUEVA LEY DE FOMENTO A LAS EXPORTACIONES

"PRESENCIA" 18 Noviembre 1981

25. MODIFICACIONES AL DECRETO LEY 14803
MINISTERIO DE INDUSTRIA, COMERCIO Y TURISMO

26. DATOS ESTADISTICOS DE ZAFRA CORRESPONDIENTE AL PRESENTE ANO

27. TARIFAS PARA ARRENDAMIENTO MENSUAL DE CIRCUITOS INTERNACIONALES
vigencia: 1/6/81 by ENTEL

28. TARIFAS DEL SERVICIO DE TELEX
vigencia: 1/6/81 by ENTEL

29. TARIFAS DE TELEFONIA NACIONAL
vigencia: 1/5/81 by ENTEL

30. TARIFAS DE TELEFONIA INTERNACIONAL

31. PRE-FEASIBILITY STUDY REPORT ON TELECOMMUNICATION DEVELOPMENT PROJECT OF THE REPUBLIC OF BOLIVIA

(2) Telephone Service Development in Bolivia and the Project

The domestic telephone network development in Bolivia up to the present as seen in the number of subscriber lines installed is presented in the table below.

BOLIVIA: NUMERO DE LINEAS TELEFONICAS
EXISTENTES EN EL PAIS POR DISTRITOS, SEGUN ANOS

DISTRITO	1975	1976	1977	1978	1979	1980
TOTAL	61.362	63.647	70.800	104.240	112.600	156.000
Chuquisaca	3.020	3.000	3.000	5.000	5.000	
La Paz	30.982	31.000	31.000	50.000	53.000	
Cochabamba	8.000	8.697	11.800	13.400	18.000	
Potosi	2.000	2.450	5.000	5.000	5.000	
Oruro	4.500	4.500	6.000	6.000	6.000	
Tarija	2.360	2.500	2.500	2.500	2.500	
Santa Cruz	9.000	9.000	9.000	19.740	20.000	
Trinidad	400	800	800	800	800	
Riberalta	200	400	400	400	600	
Camiri	500	800	800	800	800	
Villazon	100	200	200	200	200	
Tupiza	300	300	300	400	400	
Cobija	-	-	-	-	300	

FUENTE: INSTITUTO NACIONAL DE ESTADISTICA
Departamento de Estadisticas Economicas
Division de Estadisticas Productivas y Servicios
Elaborado con base en informacion de la Asociacion
Boliviana de Empresas Telefonicas (ABET).

Shown below is the percentage of the number of subscriber lines installed in each city against the nationwide total of subscriber lines.

(as of 1979)

1.	La Paz	47.07%
2.	Cochabamba	15.99
3.	Potosi	4.97
4.	Oruro	5.33
5.	Tarija	2.22
6.	Santa Cruz	18.47
7.	Beni	1.24
8.	Pando	0.27
9.	Chuquisaca	4.44

Presently, in Bolivia, the telecommunications systems are being operated by the competent government agencies, ENTEL, and Telephone Business Association of Bolivia. Each organization holds its own share of jurisdiction. In other words, the nationwide service network operation is shared by different entities.

The Telephone Business Association is composed of 17 private enterprises. These private enterprises mainly take care of local network services, covering the whole country. The toll network service is under the jurisdiction of ENTEL. The private enterprises and ENTEL have their respective service territories determined on the nationwide network so as to avoid the conflict of interests between them.

New switching equipments facilities to be realized by this project will be 8,100 as of 1990 and 13,900 as of 2000. The breakdown of such equipments according to the exchange offices to be newly established appears in the table below.

		Population		Switches	
		1985	2000	1990	2000
1	UYUNI	8,827	9,150	400	600
2	ATOCHA	8,202	14,111	300	600
3	CAMARGO	3,109	4,042	200	300
4	CAMIRI	24,167	33,743	2000	4000
5	MONTEAGUDO	4,825	7,312	300	500
6	COPACABANA	3,000	3,476	100	200
7	COROICO	2,299	4,225	200	300
8	CARANAVI	5,036	8,712	400	600
9	LLALLAGUA	39,367	49,941	2000	3000
10	HUANUNI	22,384	34,421	1500	2500
11	PUNATA	10,966	14,604	500	1000
12	CHULUMANI	2,946	4,199	200	300
	Total	135,128	187,936	8100	13900

The totals for 1990 and 2000 correspond to 5% and 9%, respectively, of the existing switching equipments as of 1980.

This project is to expand the scope of utilization of telecommunications services by

1) Expanding the telephone network so as to relieve the backlog subscribers in the rural districts, and

2) Improving the backbone transmission system for toll service.

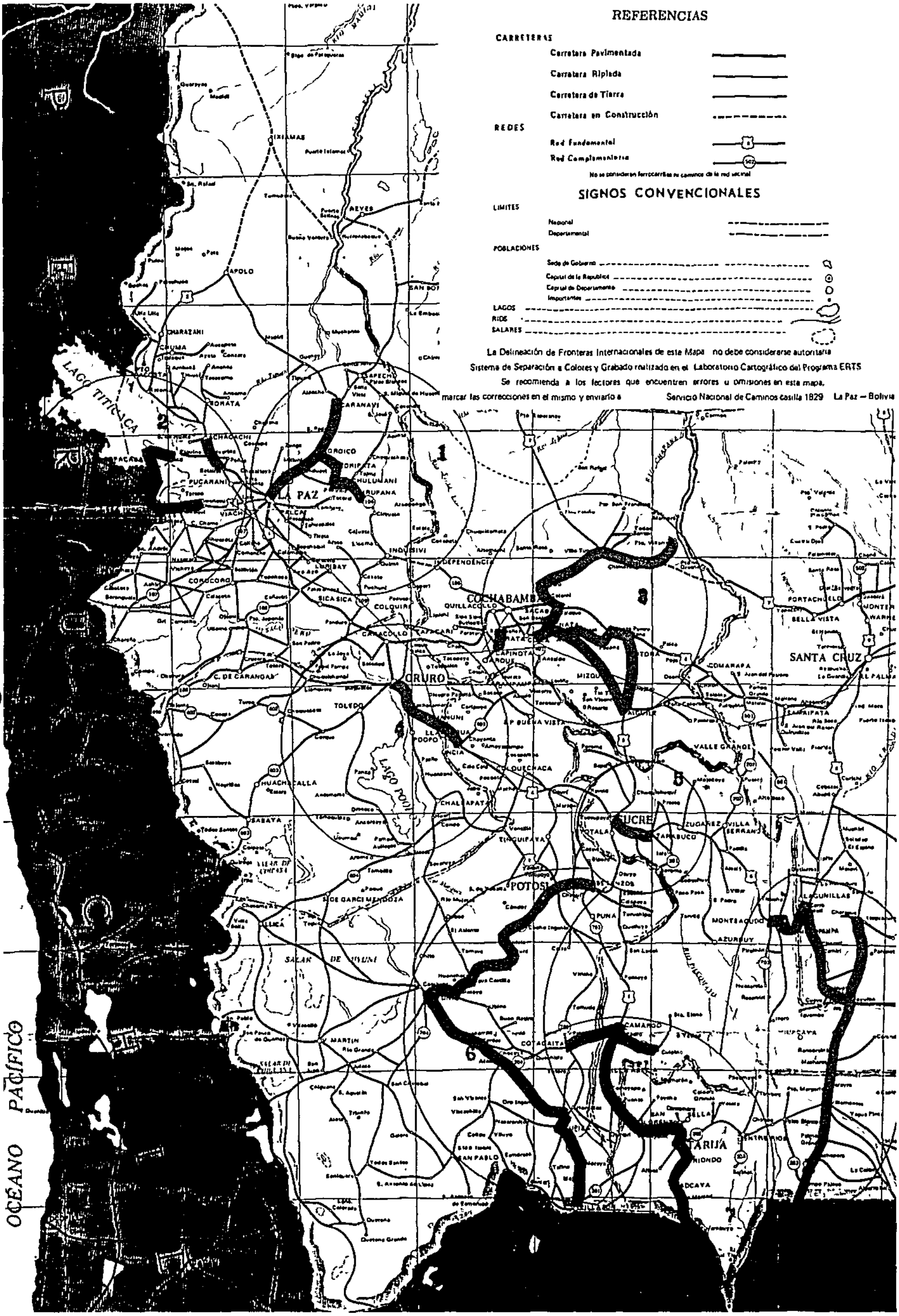


Fig. 11-1 Telecommunications Development Areas

11-1-2 Project Loan and Project Evaluation

(1) Program and Project

Based on the project implementation plan, which duly considers the basic objective of the national development plan formulated by the Government of Bolivia, the necessary program for income and expenditure management of this project is made hereunder.

The assumptions are:

- The construction work period be 2.5 years after the signing of contract with the contractor, and the system be completed so as to begin service in the early part of 1987.

- The system life be 15 years. During this period, no specific institutional requirement in the country is envisaged, so that the project is to be dedicated to the replacement of obsolete facilities with up-to-date facilities supported by the vanguard technology.

Therefore, the ways and means program is projected for the purpose of service-in in early 1987 and on prospect that the system will terminate 15 years ahead (i.e., in 2001).

The system capacity is estimated, based on telephone traffic and in consideration of the existing status of facilities. Fundamental facilities are to have sufficient capacity to meet the forecasted telephone demand as of 2000.

Additional system improvement to cater for the growth of telephone demand is to be carried out by ENTEL during the service life of the system.

Additional installation of subscriber's premise facilities, subscriber cable facilities and switching/transmission facilities is to be planned and put into practice by ENTEL.

(2) Initial Investment

The initial investment required for planning and implementation of this project is shown in Tables 11-1 and 11-2. The foreign currency portion and the local currency portion respectively total as follows:

Foreign currency portion:	¥	7,841,310,000
	($b	873,521,000)
Local currency portion:	$b	381,140,000
Total initial investment:	$b	1,254,661,000

Out of the required total initial investment, the foreign currency portion is to be procured wholly by the long term loan from the financial institution. For the local currency portion, the procurement from ENTEL's fund on hand or by some other means is assumed to be possible.

The project spending program follows:

Initial year:	$b	365,274,000
Second year:	$b	714,683,000
Third year:	$b	174,704,000

Spendings in foreign currency out of the long term loan are:

Initial year:	¥	1,568,771,000
Second year:	¥	4,706,321,000
Third year:	¥	1,566,218,000

The breakdown of equipment investment that appears in Table 11-1 coincides almost completely with the local currency conversions of the amounts quoted in Chapter 10. More precisely:

1) Cost of equipment and basic materials required for initial stage facilities and cost of factory training in the country where such equipment and materials are procured are paid out of the long term foreign currency loan from the financial institution.

2) The following cost items are partly paid out of ENTEL's fund on hand:

   - Technical guidance expense for system and hotel expense of personnel dispatched by the contractor to Bolivia for that purpose

   - Equipment installation cost

   - Consultant service fee pertaining to tender evaluation and contract assistance, as well as work execution supervising

3) Building access road related cost is wholly paid out of ENTEL's fund on hand.

The currency exchange rates of $b24.5: US$1 and ¥ 220: US$1 are used.

(3) Working Capital

When the telecommunications service entity is a single enterprise, the necessary current accounts for project management are appropriated as the working capital.

In the case of this project, the working capital is constituted as stated below. This is the result of investigation of ENTEL's financial capability as a business managing entity from various factors including the telephone tariff collection system.

1) After the construction work completion and beginning with the service-in year, each year's project revenue increment as compared with the preceding year is summed up on the capital account.

2) At the time the project life terminates, the gross working capital balance during the project life period is included in the project revenue, together with the salvage value of the project.

The working capital amount for each year is estimated below:

(Unit: $b x1000)

1st - 3rd year	-
4th year	25,108
5th year	△ 9,298
6th year	1,267
7th year	1,379
8th year	1,349
9th year	1,406
10th year	1,518
11th year	1,640
12th year	1,770
13th year	1,913
14th year	2,067

15th year	2,234
16th year	2,414
17th year	2,536
18th year	△ 37,303

For the year by year working capital amount, refer to Table 11-3 also.

(4) Operating Cost

1) Operation Management Cost

Operating cost consists of indirect cost required for the management of system construction and indirect cost required for maintenance and operation of the system constructed.

2) Maintenance Cost

Maintenance cost comprises spare parts cost, maintenance vehicle cost, maintenance personnel cost, etc.

Maintenance cost is estimated as the necessary cost for maintaining the required scale of facilities of this project. In the cost estimate is considered a more or less cost rise during the project life period. Also considered are the maintenance work efficiency in the developing countries and ENTEL's past records of maintenance.

The cost estimate is made in the annual average in consideration of the increase of repair works as the result of aging of facilities, and, at the same time, the improvement of work efficiency of maintenance personnel.

3) Gross Operating Cost

Operating cost is a sum of the preceding items 1) and 2).

Details appear in Table 11-4.

The year by year breakdown follows:

(Unit: $b x1000)

1st - 3rd year	-
4th year	68,497
5th year	46,183
6th year	60,364
7th year	63,673
8th year	66,910
9th year	70,284
10th year	73,927
11th year	77,862
12th year	82,113
13th year	86,704
14th year	91,664
15th year	97,025
16th year	102,818
17th year	108,905
18th year	108,917

(5) Salvage Value of Project

The salvage value of the project at the time of its termination (15 years after the service-in) is not of the nature that can be accurately calculated. However, this time, it is estimated at 10% of the amount of equipment investment at the time of the service-in, and is included in the project revenue at the final year. For details, refer to Table 11-3.

(6) Tariff System

The existing telephone tariff system in Bolivia is shown in Table 11-5 and 11-6.

For the new telephone tariff system to be determined with the coming into practice of this project, the following assumption is set:

1) Telephone Installation Fee

Telephone circuit retaining fee

(Right to use circuit fee): $b 17,150/circuit

2) Basic Tariff

Three stages are assumed.

First stage (commercial area): $b 800/month

Second stage (business establishment area): $b 400/month

Third stage (residential area): $b 136/month

3) Local Call Tariff

a) General subscriber's call:

The uniform rate covered by the basic tariff is to apply

b) Public telephone call: $b 2/call

4) Toll Call Tariff

The one minute/one minute, measured rate by distance system, i.e., the proportional tariff to call duration system, is to apply. A typical toll call tariff chart appears in Table 11-5.

5) TV Circuit Lease Charge

The new TV circuit lease charge are assumed as follows;

La Paz - Santa Cruz	$b 640,000/month
La Paz - Tupiza	$b 550,000/month
La Paz - Camiri	$b 780,000/month
La Paz - Borinda	$b 100,000/month

For details, see Table 11-6.

(7) Operating Revenue

The operating revenue that results from the coming into practice of this project consists of the following items:

- Revenue during the service life of the project, originating from new equipment investment:

  1) Revenue from telephone subscriber's premise facilities retaining fees

  2) Revenue from local telephone service

  3) Revenue in terms of opportunity cost whereby the toll transmission network to be newly established by this project contributes to the toll telephone service

  4) Part of Revenue from TV circuit lease charge

  5) Revenue from other services
     The assumption is that this project contains no plan to use for telex and telegraph services any part of facilities improved and expanded. The assumption also applies to the effect that this project aims in no part whereof to contribute to international telephone service.

Items to be considered as variables in the estimation of revenue from telephone service include the following, besides the system facilities improvement plan:

- Telephone tariff plan
- Holding time of telephone users
- Telephone traffic between exchanges
- Mean value of busy hour traffic per local/toll subscriber
- Telephone facilities utilization efficiency

The gross operating revenue of this project is the sum of the foregoing revenue items 1) through 5). The year by year breakdown follows:

(Unit: $b x1000)

1st - 3rd year	-
4th year	251,076
5th year	158,101
6th year	170,769
7th year	184,557
8th year	198,044
9th year	212,104
10th year	227,285
11th year	243,680
12th year	261,390
13th year	280,520
14th year	301,188
15th year	323,524

16th year	347,661
17th year	373,023
18th year	373,075

For further details, see Table 11-7.

(8) Subsidy Grant from National Treasury

The budget to ENTEL from the national treasury in 1980 totaled $b 108,118.

The Government of Bolivia annually grants subsidy to the telecommunications business. The subsidy policy motivations are diverse. Here, the year by year subsidies considered to be pertinent to the implementation of this project are estimated.

(Unit: $b x1000)

1st year	38,114
2nd year	38,114
3rd year	-
4th year	-
5th year	-
6th year	1,454
7th year	454
8th year	8,000
9th year	1,454
10th year	-
11th year	-
12th year	1,908
13th year	8,000

14th year	-
15th year	1,454
16th year	-
17th year	454
18th year	-

The estimated total subsidy grant during the project life period amounts to $b 99,406,000.

(9) Project Loan

The itemized project loan estimate comprises the aggregate value of equipments of all kinds required for the project implementation and the foreign currency appropriations for installation of those equipments, as well as the consultant service fee.

(Unit: Million yen)

Telecommunications system equipments	4,970.4
Consultant service fee	396.6
Others	2,474.3
Total	7,841.3

(10) Project Loan Disbursement

The requested project loan will be disbursed during the construction work period in accordance with the work schedules.

The loan portion covering the procurement of equipment by import will be disbursed in the CIF value. The loan portion covering services will be disbursed in the foreign currency equivalent.

Shown below are the project loan disbursements estimated in the local currency.

(Unit: $b x1000)

1984:	174,704
1985:	524,113
1986:	174,704
Total	873,521

The currency to be used in the project loan disbursement is the currency of the loan financing country. The terms of disbursement can be determined between the parties concerned pending prior approval and permission by the authorized institution of the loan financing country.

The payment for procured goods is to be made upon fulfilment of order, in principle. Ordinarily, such payment is to be settled against shipment of the goods concerned.

The payment for services provided is to be made upon completion of each service, in principle, at the reasonably determined rate. Where necessary, advance payment is made.

As regards the construction work contingencies which are included in the project loan amount disbursed as per above, it is possible to appropriate such contingencies as project cost in case where they are used to pay for the purchase of additional goods in practically the same way as the payment for equipment/materials to be procured by the loan when the construction work actually gets underway. Such arrangement, however, requires prior negotiations with and approval of the loan financing institution.

(11) Interest Payment and Loan Repayment

From the viewpoint of facilitation of interest payment and loan repayment, it is desirable that the project loan be a long term, low interest loan.

For interest payment and loan repayment, the following conditions are considered:

		(1)	(2)	(3)
1.	Repayment Period	20 years	25 years	30 years
2.	Grace Period	5 years	7 years	10 years
3.	Interest Rate	11%	5%	4%

The following fund procurement and application are estimated based on the typical condition (2).

A detailed interest payment and loan repayment plan is in Table 11-8.

(12) Fund Procurement and Application

1) Fund Procurement

For fund procurement, the following items are considered:

- Operating Revenue

  comprising telephone installation fees to be paid by subscribers, local and toll telephone service revenue, and TV circuit lease rentals

- Foreign Fund Introduction

  project loan from financial institution to organize foreign currency budget for project implementation

- Fund on Hand

  ENTEL's internal fund to organize local currency budget for project implementation

2) Fund Application

   For fund application, the following items are considered:

   - Construction Investment

     investment for system construction by the project

   - Operating Cost

     cost of operation, management and maintenance of system constructed by the project

   - Working Capital

     floating capital for project management by the responsible entity

   - Interest Payment

     payment of interest on loan principal

   - Loan Repayment

     repayment of loan principal during the loan period

   Concrete figures for these fund application items are given in Table 11-9.

(13) Analysis of Profit Ratio of Total Liabilities and Net Worth (Part 1)

The financial internal rate of return of this project can be estimated by the following method of analysis for the profit ratio of total liabilities and net worth:

$$I = \sum_{v} \frac{Cv}{(1+i)^{v}} - \text{(Salvage Value)}$$

$$D = \sum_{v} \frac{dv}{(1+i)^{v}}$$

$$I + D = R = \sum_{v} \frac{rv}{(1+i)^{v}}$$

where

I : Present worth of construction cost in the fixed capital of project

D : Present worth of gross expense required for project management

R : Present worth of revenue obtainable from project operation

i : Discount rate

v : Project year concerned

Cv: Annual capital expense of project

dv: Annual operating expense of project

rv: Annual revenue from project

($b x1000)

Gross Revenue
by Years
(R - I - D)

1	2	3	4	5	6
△365,274	△762,326	△174,704	157,471	121,216	105,503
7	8	9	10	11	12
118,369	109,785	136,779	151,840	164,178	172,735
13	14	15	16	17	18
171,903	207,457	220,630	242,429	260,446	328,825

Financial internal
rate of return: 7.65%

(14) Analysis of Profit Ratio of Total Liabilities and Net Worth (Part 2)

Provided that the subsidy grant to finance the project implementation is available from the Government of Bolivia, the internal rate of return of the project is 8.51%. The estimated total subsidy grant during the project life period amounts to $b 99,406,000. A detailed estimates by Project years are shown in Paragraph 11-1-2-(8).

(15) Analysis of Profit Ratio of Net Worth

From the viewpoint of public utility cost guarantee, the profit as opportunity cost of the net worth is analyzed. The finding follows:

Profit ratio of net worth = 13.51%

(16) Economic Analysis by Shadow Price

Analysis is made as to the prevalent potential unemployment in Bolivia due to the dual architecture of the economy, as well as the protectionism external trade structure and the effective national currency rate of the country.

At the same time, the evaluation of this project on the frontier base is carried out. By these means, the economic investment efficiency of this project can be estimated.
The economic internal rate of return = 9.87%

(17) Sensitivity Analysis

Sensitivity Analysis is made on the assumption that when the system constructed by this project comes into operation in the future, the construction investment and operating revenue evaluations in th financial analysis will be realized in the pessimistic direction from the viewpoint of project finance.
Also on the assumption that the completion of construction work will be delayed behind schedule, sensitivity analysis is carried out.

1) In case where the construction investment increases by 10% :

   Financial Internal Rate of Return = 6.48%

2) In case where the operating revenue decreases by 10%
   Financial Internal Rate of Return = 6.22%

3) In case where the construction investment increases by 10% and the operating revenue decreases by 10%
   Financial Internal Rate of Return = 5.09%

11-1-3 Subjects of Project Investment Study

(1) Initial Investment Study

In this project as a technical system plan, the undermentioned items 1) through 3) are considered. Hence, the cost reduction supervenes in the equipment investment amount.

1) Introduction of MAS system in part of subscriber circuit facilities

2) Introduction of 24/60 channels UHF system and 6 channels VHF system

3) Simplification of radio station buildings and equipment

(2) ENTEL's Service Sphere and Subscriber Diversification

1) Toll service networks by short wave (HF), which are under the control of ENTEL, exist in 17 rural communities. The most part of these rural toll networks will be incorporated into the system to be newly established by this project.

2) Presently, the Directorate General of Telecommunications (DGT) provides service independently by its HF and open wire circuits. In the areas covered by this project, those DGT circuits will probably be absorbed by the projected new system.

3) Generally speaking, the telephone service network will become composed of

- Local telephone facilities directly connected to subscribers;

- Trunk switching facilities and toll transmission facilities for toll telephone service.

Although the local telephone service throughout the country is presently managed by the private companies, new local telephone facilities to be established by this project are to be operated by ENTEL.

This means that ENTEL will provide in some areas such complete telephone service that caters for demand from resident subscribers between cities also.

The fact above makes it possible to expect improvement in the operational aspect of ENTEL as a public service organization.

4) The telecommunications service constitutes an important national and social infrastructure and forms the foundation of the development of economy. Therefore, the right to use telecommunications (or telephone subscription, to be exact) should be diffused not only among government offices and commercial establishments including merchant houses but also among small communities even more extensively than in the past.

However, in Bolivia, the telephone subscription fee to be paid by the user public who want their telephone circuits is by far higher than the announced price. The market price at present is US$1,000 to US$1,200 per circuit.

This price is about three times, or even more, the income of the average salary earners in Bolivia. Hence, the people in general seldom or never possess their telephones.

In this project, ENTEL is to make capital investment down to the installation of subscriber's premise facilities. This fact may serve as a curb on the telephone subscription fee spiral and may lead to the telephone subscription availability at the announced fee level.

From the fact above, the telephone subscriber diversification throughout the country can be expected.

(3) Telephone Tariff System

For establishing the telephone tariff system, the following considerations are essential:

1) From the viewpoint of self-supporting accounting of telephone service, the tariffs must be such as to ensure the fair cost indemnity.

2) The tariffs must be at a level where fair surplus can square fair cost, and, for this purpose, a fixed internal reserve must be maintained. This is to enable telephone service to respond fully to the national expectation about its performance as a basic infrastructure, and also to stabilize the telephone business management.

3) Part of new local telephone service to be put into practice by this project is to be placed under the control of ENTEL in the future. In this connection, the dual tariff system covering the subscription fee and the local call rate also, one to be managed by private companies and the other by ENTEL, may have to be studied.

Here, in consideration of the needs from the viewpoint of national economy and the opportunity cost characteristic of capital, in addition to the foregoing 1) and 2) requirements, the telephone tariff system deemed to be fittest for the project implementation is postulated. (Refer to Table 11-5 and Table 11-6)

(4) Earning Power of Project

For the estimation of earning power of this project, the following assumptions are used:

1) The forecasted subscriber calling rate, newly required subscriber circuits and traffic demand will be realized during the service life of the project.

2) The technical and operational efficiencies of the telecommunications service of ENTEL will remain unchanged, either with or without the project.

3) Also to be considered for the estimation of the project's earning power are:

- In the project cost estimate, the Transportation cost are quoted at a high level.

- The inflationary trend continues.

- The coverage areas of the project are widely spread with rocky ground here and there. The construction investment includes a large amount of local currency investment.

- In the existing tariff system, the toll tariff is especially high, considering the national income level, so that any special tariff raise in the future is inconceivable.

- Many of areas covered by the project are the rural areas where the telephone demand potential is small.

(5) Subsidy Grant from Government

For the implementation of this project, a large amount of local currency investment is required. And the result of financial analysis of the investment plan shows that the earning power of the project should be improved.

It is desirable to use the subsidy grant from the Government of Bolivia for at least a part of local currency budget to finance the construction work. The year by year breakdown of ENTEL's local currency requirements during the project life follows:

Break down of ENTEL's Local currency requirements during the project life (Unit: $b x1000)

1st year	190,570
2nd year	190,570
3rd year	-
4th year	-
5th year	-
6th year	3,635
7th year	1,136
8th year	20,000
9th year	3,635
10th year	-
11th year	-
12th year	4,771
13th year	20,000
14th year	-
15th year	3,635
16th year	-
17th year	1,136
18th year	-

11-2 Project Evaluation

11-2-1 Rate of Return Analysis

Rate of Return	With Government Subsidy	Without Government Subsidy
1. Economic Internal Rate of Return	-	9.87%
2. Financial Internal Rate of Return	8.51%	7.65%
- Sensitivity Analysis -		
The construction investment increase by 10%	-	6.48%
The operating revenue decrease by 10%	-	6.22%
The construction investment increase by 10% and the operating revenue decrease by 10%	-	5.09%
3. Profit Ratio of Net Worth	-	13.51%

(1) Economic Internal Rate of Return

The economic internal rate of return, 9.87%, of this Project is considered to uphold the full feasibility of project implementation when viewed from the angle of capital as opportunity cost. The Project itself is aimed at an integral development of rural areas.

(2) Financial Internal Rate of Return

Comments on the financial internal rate of return of this Project are made in Paragraph 11-1-3-(4).
The financial internal rate of return of 7.65% is not exactly as high as desired for the rural area development project.

However, when the subsidy grant from the national treasury (subsidy grant total required: $b 99,406,000) is available, the financial internal rate of return will improve to 8.51%. This figure is considered to be sound enough to ensure a full internal reserve required to keep the project capital going.

The financial internal rate of return quoted above is an estimate from the optimum new tariff system. This new system derives from composite studies of telecommunications systems as public utility and all requirements from the viewpoint of national economy, with an eye to thorough modification of the existing complicated tariff system.

(3) Profit Rate of Net Worth

The profit rate of net worth, 13.51%, exceeds the financial internal rate of return obtained by the profit rate method. By the implementation of this Project, the stability of net worth can be fully ensured.

11-2-2 Social Impact of Telecommunications Development in Rural Areas

In Bolivia, the interflows among cities are scarce. The main reasons are:

(1) Roads are poorly built and their improvement is not easy.

(2) Railways are not available as much as required.

(3) The air transport capacity is limited.

The factors (1) and (2) above are due to the rocky ground that spreads in most part of the country. Also to be noted is that the elevation above sea level varies from city to city.

All these are impedimental to the economic development of the country.

The principal transport media for business purpose are large-sized trucks. In some mining areas, railways are utilized; however, for all product categories as a whole, the transport by trucks holds the major weight.

La Paz and Santa Cruz, the big two cities, are the distribution centers for products of all kinds in the rural areas. These two cities are the external trade centers also. In the suburbs of Santa Cruz, a new international airport, the biggest in the country, is scheduled to be completed in the near future.

The road network improvement/development is presently underway on the nationwide scale. With this, the telephone demand is also on the uptrend in all parts of the country.

The eight telecommunications development areas as shown in Figure 11-1 on Paragraph 11-1-1 are denominated here as follows:

(1) Caranavi Area

(2) Copacabana Area

(3) Punata Area

(4) Oruro Area

(5) Sucre Area

(6) Potosi Area

(7) Tarija Area

(8) Camiri Area

These eight areas, where the telecommunications facilities will be improved and expanded by this project, constitute the key areas in the regional development of the country.

(1) Caranavi Area

This area is the center of agriculture and stockfarming. Further development to the north is expected in the future. Caranavi is the midway point on the road to/from La Paz.

(2) Copacabana Area

In this area, the key road network has been completed. A group of satellite cities as the sources of closer traffic to/from La Paz are scattered. Main industries are agriculture and mining.

(3) Punata Area

This area is the agricultural area. Dry field farming thrives over the expansive plain lands. Punata is the liaison base with Cochabamba in the agricultural development. Cochabamba is located halfway between La Paz and Santa Cruz.

(4) Oruro Area

This area forms the center of mining activities. Mining towns are developed in and around this area. Mine products for export are supplied to La Paz by railway and main road. Tin and silver are the main mine products. These two product categories plus sugar are the principal foreign currency earners for the country.

(5) Sucre Area

In this area are scattered the towns where mining business propspers. The air transport is available. The main road to Cochabamba is also developed. Sucre is the administrative capital city of the country. Hence the need for close administrative contact with La Paz and for further progress of modernization.

(6) Potosi Area

Potosi is a leading mining city. In such mining cities as Uyuni and Atocha, a medium capacity toll transmission line is necessary for the purpose of closer contact with Potosi. In the mining cities, labor productivity is at a higher level than the average throughout the country. Hence a large demand for TV. Therefore, the system design in this project must be such as to make TV broadcasting possible in the future. Villazon is a frontier city catering for transportation to/from Argentina.

(7) Tarija Area

Tarija is one of the important cities in southern Bolivia. Main communication targets are Sucre, Camiri and La Paz.

(8) Camiri Area

Camiri and its environs constitute the oil producing center. Oil, along with natural gas, ensures the country's self-sufficiency in the energy procurement. The whole area is the energy source treasures.

As seen in Figure 11-1, industries spread all over the country. Establishment of closer ties between rural cities and the two central cities, La Paz and Santa Cruz, by telecommunications media, in addition to the main roads, is the prime objective of national development plans. Considering such time demand elements as road network improvement the implementation of this project in the near future is considered to be the timely, well-advised decision.

Table 11-1 Project Cost

(Unit: $b x 1,000)

Item	Foreign portion	Local portion	Total
1. Equipment Portion			
1) Switching Plant	208,975	11,470	220,445
2) Outside Plant	116,569	171,290	287,859
3) Transmission Plant	424,389	71,220	495,609
Sub-Total 1.	749,933	253,980	1,003,913
2. Civil Work Portion			
1) Building	0	30,920	30,920
2) Access Road	0	50,550	50,550
Sub-Total 2.	0	81,470	81,470
3. Consultancy	44,177	11,040	55,217
4. Contingency	79,411	34,650	114,061
Sub-Total 3. 4.	123,588	45,690	169,278
Grand Total	873,521	381,140	1,254,661

Table 11-2 Capital Expenditure

(Unit: $b x 1,000)

Period	Capital Expenditure	
1	365,274	(174,704)(*)
2	714,683	(524,113)
3	174,704	(174,704)
4	-	
5	-	
6	3,635	
7	1,136	
8	20,000	
9	3,635	
10	-	
11	-	
12	4,771	
13	20,000	
14	-	
15	3,635	
16	-	
17	1,136	
18	-	
Total	1,312,619	(873,521)

(*) In parenthese is the foreign currency portion.

Table 11-3 Working Capital & Project Salvage Value

(Unit: $b x 1,000)

Period (Year)	Working Capital	Project Salvage Value
1	-	-
2	-	-
3	-	-
4	25,108	-
5	Δ 9,298	-
6	1,267	-
7	1,379	-
8	1,349	-
9	1,406	-
10	1,518	-
11	1,640	-
12	1,770	-
13	1,913	-
14	2,067	-
15	2,234	-
16	2,414	-
17	2,536	-
18	Δ37,303	55,369

Table 11-4 Operating Expenses

(Unit: $b x 1,000)

Period (Year)	Operating & Administrative Expenses	Maintenance Expenses	Total Operating Expenses
1	-	-	-
2	-	-	-
3	-	-	-
4	60,258	8,239	68,497
5	37,944	8,239	46,183
6	40,985	19,379	60,364
7	44,294	19,379	63,673
8	47,531	19,379	66,910
9	50,905	19,379	70,284
10	54,548	19,379	73,927
11	58,483	19,379	77,862
12	62,734	19,379	82,113
13	67,325	19,379	86,704
14	72,285	19,379	91,664
15	77,646	19,379	97,025
16	83,439	19,379	102,818
17	89,526	19,379	108,905
18	89,538	19,379	108,917

Table 11-5 Telephone Tariffs (1)

Local Call Tariff - 1 -

The uniform rate covered by the basic tariff is to apply.

Primera Categoria Tarifa Comercial

$b 800 per month	Corresponde a las lineas telefónicas instaladas en entidades comerciales o industriales, hoteles, Pensiones, residenciales, alojamientos, cafés, confiterias, salas cinematográficas, casinos, cantinas, restaurantes, locales de expendio de articulos, depósitos y almacenes comerciales e industriales, empresas de transportes, comunicaciones y de servicio público, dependencias del Gobiemo Central, Municipalidades, Entidades públicas, Autónomas, semiautónomas, estatales, paraestatales, autárquicas, semiautárquicas, instituciones bancarias estatales o privadas, de seguros o cambio, sedes de representaciones diplomáticas, consulares y, en general, todas las instituciones o entidades que desarrollen actividades de carácter lucrativeo, comercial y/o institucional.

Segunda Categoria Tarifa Profesional

$b 400 per month	Corresponde a las lineas telefõnicas instaladas en clinicas, hospitales, sanatorios y similares, sean oficiales, privadas, misionales o cooperativas, farmacias, droguerias, laboratorios o similares, consultorios médicos, dentales, y de todas las especialidades médicas, bufetes de abogados, consultorios de profesionales en general, oficinas de contabilidad, auditoria, ingenieria, entidades culturases y de beneficencia, hogares para niños, ancianos asilos y similares, residencias de profesionales que incluyan escritorio privade o consultorio, iglesias, conventos, internados y establecimientos educacionales e institutos de enseñanza en general.

Table 11-5 Telephone Tariffs (1)

Local Call Tariff - 2 -

Tercera Categoria Tarifa Particular

$b 136 per month	Corresponde a las lineas telefónicas instaladas en residencias, departamentos o habitaciones destinadas a viviendas familiares.

Table 11-5 Telephone Tariffs (2)

Toll Call Tariff - 1 -

EMPRESA NACIONAL DE TELECOMUNICACIONES "ENTEL"

TARIFAS DE TELEFONIA NACIONAL

(Incluidos los impuestos de ley)

SISTEMA DE MICROONDAS

Vigencia: 1-5-81

GRADO TARI-FARIO	TRAMOS	MODA-LIDAD	SERV. SEMIAUTOMATICO		SERV. AUTOMATICO	
			MINUTO ADIC.	PRIMEROS 3 MINUTOS	TARIFA FOR MINUTO	MINUTO ADIC.
		A A	27	83		
		A A R	20	62		
		P P	27	105		
	SUCRE - POTOSI	P P R	20	78		
03		C I	23			
	LA PAZ-COPACABANA	C I R	17			
		D.D.D.			29	29
		" (R)			22	22
		"(ER)			17	17
		A A	29	87		
		A A R	21	65		
		P P	29	111		
		P P R	24	81		
04	ORURO-COCHABAMBA	C I	17			
		C I R				
		D.D.D.			30	30
		" (R)			23	23
		"(ER)			18	18
	LA PAZ - ORURO	A A	30	92		
	COCHABAMBA-SUCRE	A A R	23	69		
	LA PAZ-COCHABAMBA	P P	30	117		
	ORURO - SUCRE	P P R	23	87		
05	ORURO - POTOSI	C I	26			
	POTOSI - TARIJA	C I R	18			
	COCHABAMBA-POTOSI	D.D.D.			32	32
	STA. CRUZ-SUCRE	" (R)			24	24
	SUCRE - TARIJA	"(ER)			19	19
		A A	32	96		
	ORURO-COPACABANA	A A R	23	71		
	COCHABAMBA-STA.CRUZ	P P	30	123		
	COCHABAMBA-TRINIDAD	P P R	23	90		
06	COCHABAMBA-COPACBNA.	C I	27			
	STA. CRUZ - POTOSI	C I R	20			
	STA. CRUZ-TRINIDAD	D.D.D.			33	33
		" (R)			25	24
		"(ER)			20	20

Table 11-5 Telephone Tariffs (2)

Toll Call Tariff - 2 -

GRADO TARI-FARIO	TRAMOS	MODA-LIDAD	SERV. SEMIAUTOMATICO		SERV. AUTOMATICO	
			MINUTO ADIC.	PRIMEROS 3 MINUTOS	TARIFA FOR MINUTO	MINUTO ADIC.
07	LA PAZ - SUCRE LA PAZ - TRINIDAD LA PAZ - POTOSI STA. CRUZ-ORURO ORURO - TRINIDAD STA. CRUZ-TARIJA ORURO - TARIJA SUCRE - TRINIDAD TRINIDAD-COPACBNA. COCHABAMBA-TARIJA	A A	33	101		
		A A R	24	74		
		P P	33	129		
		P P R	24	93		
		C I	29			
		C I R	20			
		D.D.D.			35	35
		" (R)			26	26
		"(ER)			20	20
08	SUCRE-COPACABANA POTOSI-COPACABANA POTOSI-TRINIDAD LA PAZ-STA. CRUZ	A A	36	110		
		A A R	27	83		
		P P	36	141		
		P P R	27	105		
		C I	32			
		C I R	23			
		D.D.D.			38	38
		" (R)			29	29
		"(ER)			22	22
09	LA PAZ - TARIJA STA.CRUZ-COPACABNA. TARIJA-TRINIDAD TARIJA-COPACABANA	A A	39	119		
		A A R	29	87		
		P P	39	153		
		P P R	19	111		
		C I	35			
		C I R	24			
		D.D.D.			41	41
		" (R)			30	30
		"(ER)			23	23

PSG/GEC/mv.

Indicaciones

A A	:	Comunicacion de Aparato-Aparato
P P	:	Comunicacion de Persona a Persona
D.D.D.	:	Discado Directo a Distancia
C I	:	Cargo de Informe
A A R	:	Comunic. Aparato-Aparato con Tarifa Reducida
P P R	:	Comunic. Persona a Persona con Tarifa Reducida
D.D.D(R)	:	D.D.D. con Tarifa Reducida
D.D.D(ER)	:	D.D.D. con Tarifa Especial Reducida
C I R	:	Cargo de Informe de Tarifa Reducida

Table 11-5 Telephone Tariffs (3)

CONTRATO DE SUSCRIPTION DE ACCIONES TELEFONICAS
por el presente documento privado que podra ser elevado a escritura publica se celebra un CONTRATO DE SUSCRIPCION DE ACCIONES TELEFONICAS La Enpresa Nacional de Telecomnicaciones representada por su Gerente General, que en adelante se denominara el ABONADO, al tenor de las diguientes Clausulas
PRIMERA - VALOR neto de las telefonicas que da derecho al ABONADO a la instalacion y uso de una linea telefonica es de SETECIENTOS 00/100 dolares americanos ($us 700)
SEGUNDA - PLANES DE PAGO -- El valor de las telefonicas establecido en la CLAUSULA PRIMERA podra ser pagado por el ABONADO bajo cualesquiera de los siguientes planes de pago, en pesos bolivianos al cambio vigente in la fecha del pago.

PLANES DE PAGO	valor neto unitario por lineos Telefonica $us	interese por financiamiento $us	Cuota inicial de - Suscription $us	Cuota Mensual Inclidos intereses $us	Costo Total
AL CONTADO	700	--	--	--	700
PLAN 12-M (12 meses plazo)	700	33	61	56	731
PLAN 24-M (24 meses plazo)	700	67	95	28	764
PLAN 36-M (36 meses plazo)	700	100	128	19	798

Se deja constancia expresa que los intereses de los Pago de 12, 24 y 36 meses no representan aportacion al capital social de ENTEL ni al valor de las telefonicas por ser resultantes de los costos de financiamiento.

Table 11-6 TV circuit Lease Charge by ENTEL

La Paz - Santa Cruz	$b 640,000 per month
La Paz - Tupiza	$b 550,000 per month
La Paz - Camiri	$b 780,000 per month
La Paz - Borinda	$b 100,000 per month

IN CASE OF INTERNATIONAL TV RELAY BROADCASTING

KINDS OF BROADCASTINGS	1 (*)	2	3
FIRST 10 MINUTES	950	550	250 (us$)
BY INCREASE OF EVERY ONE MINUTES	31	17	12 (us$)

NOTE : (*) Which kind of charge to apply depends upon which kind of broadcasting to make.

Table 11-7 Operating Revenue

(Unit: $b x 1,000)

Period	From telephone subscriber's premise facilities retaining fees (1)	From local telephone service (2)	From trunk telephone service (3)	From TV circuit lease charge (4)	Revenue Total
1	-	-	-	-	-
2	-	-	-	-	-
3	-	-	-	-	-
4	113,190	45,034	86,703	6,149	251,076
5	8,575	49,087	94,290	6,149	158,101
6	8,575	53,505	102,540	6,149	170,769
7	8,575	58,320	111,513	6,149	184,557
8	9,038	61,586	121,271	6,149	198,044
9	9,038	65,035	131,882	6,149	212,104
10	9,038	68,677	143,421	6,149	227,285
11	9,038	72,523	155,970	6,149	243,680
12	9,038	76,584	169,619	6,149	261,390
13	9,038	80,873	184,460	6,149	280,520
14	9,038	85,401	200,600	6,149	301,188
15	9,038	90,184	218,153	6,149	323,524
16	9,038	95,234	237,240	6,149	347,661
17	9,038	100,080	257,756	6,149	373,023
18	9,090	100,080	257,756	6,149	373,075

Table 11-8 Loan Interest Payment & Loan Principal Repayment Schedule

(Unit: $b x 1,000)

Period (Year)	Foreign Loan	Cumulative Foreign Loan	Repayment of Foreign Loan	Cumulative Instalment	Balance of Foreign Loan	Interest Payment
1	174,704	-	-	-	174,704	8,735
2	524,113	698,817	-	-	698,817	34,941
3	174,704	873,521	-	-	873,521	43,676
4	-	-	-	-	873,521	43,676
5	-	-	-	-	873,521	43,676
6	-	-	-	-	873,521	43,676
7	-	-	-	-	873,521	43,676
8	-	-	48,529	-	824,992	41,250
9	-	-	48,529	97,508	776,463	38,823
10	-	-	48,529	145,589	727,934	36,397
11	-	-	48,529	194,116	679,405	33,970
12	-	-	48,529	242,645	630,876	31,544
13	-	-	48,529	291,174	582,347	29,117
14	-	-	48,529	339,703	533,818	26,691
15	-	-	48,529	388,232	485,289	24,264
16	-	-	48,529	436,761	436,760	21,838
17	-	-	48,529	485,290	388,231	19,412
18	-	-	48,529	533,819	339,702	16,985
19	-	-	48,529	582,348	291,173	14,559
20	-	-	48,529	630,877	242,644	12,132
21	-	-	48,529	679,406	194,115	9,706
22	-	-	48,529	727,935	145,586	7,279
23	-	-	48,529	776,464	97,057	4,853
24	-	-	48,529	824,993	48,528	2,426
25	-	-	48,528	873,521	0	0
						633,302

Table 11-9 Cash Flow Statement (1)
- Cash Inflow -

(Unit: $b x 1,000)

Period (Year)	Operating Revenue	Foreign Loan	Total Cash Inflow
1	-	174,704	174,704
2	-	524,113	524,113
3	-	174,704	174,704
4	251,076	-	251,076
5	158,101	-	158,101
6	170,769	-	170,769
7	184,557	-	184,557
8	198,044	-	198,044
9	212,104	-	212,104
10	227,285	-	227,285
11	243,680	-	243,680
12	261,390	-	261,390
13	280,520	-	280,520
14	301,188	-	301,188
15	323,524	-	323,524
16	347,661	-	347,661
17	373,023	-	373,023
18	373,075	-	373,075

Table 11-9 Cash Flow Statement (2)
- Cash Outflow -

(Unit: $b x 1,000)

Period (Year)	Investment in Fixed Assets(*)	Investment in Current Assets	Operating Expenses	Repayment of Foreign Loan	Interest on Foreign Loan	Total Cash Outflow
1	365,274	-	-	-	8,735	374,009
2	714,683	-	-	-	34,941	749,624
3	174,704	-	-	-	43,676	218,380
4	-	25,108	68,497	-	43,676	137,281
5	-	Δ 9,298	46,183	-	43,676	80,561
6	3,635	1,267	60,364	-	43,676	108,942
7	1,136	1,379	63,673	-	43,676	109,864
8	20,000	1,349	66,910	48,529	41,250	178,038
9	3,635	1,406	70,284	48,529	38,823	162,677
10	-	1,518	73,927	48,529	36,397	160,371
11	-	1,640	77,862	48,529	33,970	162,001
12	4,771	1,770	82,113	48,529	31,544	168,727
13	20,000	1,913	86,704	48,529	29,117	186,263
14	-	2,067	91,664	48,529	26,691	168,951
15	3,635	2,234	97,025	48,529	24,264	175,687
16	-	2,414	102,818	48,529	21,838	175,599
17	1,136	2,536	108,905	48,529	19,412	180,518
18	-	Δ37,303	108,917	48,529	16,985	137,128

Residual repayment of Foreign Loan: 339,702

Residual interest on Foreign Loan : 50,955

(*) "Investment in Fixed Assets" includes the local portion by ENTEL.

Table 11-9 Cash Flow Statement (3)
- Net Cash Flow -

(Unit: $b x 1,000)

Period (Year)	Net Cash Flow
1	Δ 199,305 (*)
2	Δ 225,511
3	Δ 43,676
4	113,795
5	77,540
6	61,827
7	74,693
8	20,006
9	49,427
10	66,914
11	81,679
12	92,663
13	94,257
14	132,237
15	147,837
16	172,062
17	192,505
18	235,947

Residual repayment of Foreign Loan: 339,702

Residual interest on Foreign Loan : 50,955

(*) The deficits in the initial, second and third years amounting to 199,305, 225,511 and 43,676, respectively, are to be covered by the domestic funds.

ANNEX

ANNEX - I

Transition to Digital Network

1. General Remarks
2. Detailed Study of Problems
3. Digital System Introduction Schedule
4. Conclusion

ANNEX-I TRANSITION TO DIGITAL NETWORK

1. General Remarks

1-1 Outline

This report is for study of the most desirable form of development of the telecommunication network in Bolivia, that is, whether the network should continue to be the analog network as it presently is or should be transferred to the digital network. Also contained in this report are the recommendations about the way to cope with the technical difficulties involved in the network digitalization when it is the choice, as well as how and where to introduce the necessary new facilities.

1-2 World Trend

As the result of the rapid development of integrated circuit (IC) technology, the transition from the electromagnetic (analog) telephone switching to the electronic (digital) switching is now the worldwide trend. In other words, the crossbar switching system as the representative analog product is being fast replaced by the electronic switching system that represents the digital technology.

The leading telecommunication equipment manufacturers in the world have already reduced broadly the crossbar switching equipment production quantity. Furthermore, in view of the fact that all the service categories to be newly developed can be realized by the digital technology, many countries have begun to introduce the digital switching equipment in their telecommunication networks.

The digital switching equipment has its greatest merit in that it can realize ISDN, i.e., Integrated Service Digital Network. Among other merits are that the fault rate is extremely low, compared with the conventional electromagnetic equipment, because the very highly reliable parts are used, and that another new service or new technology can be introduced with relative ease and at reasonable cost.

The fact above shows that even if the need for ISDN is small, the digital equipment is useful for the telecommunication network improvement. At the same time, when the digital equipment is used, it is possible to keep abreast of the progress of other new technology.

Since the production of electromagnetic equipment, such as crossbar switching equipment, is being reduced, it is doubtful whether the electromagnetic parts and components can be obtained at reasonable prices 20 years from now.

In Bolivia, there is no domestic manufacturer of telecommunication equipment. Therefore, it is recommended that the country, when introducing the digital equipment from abroad, does exercise utmost care to select the reliable brand with full utility records.

The digital equipment is already in operation in many countries. Today, the digital equipment can be procured at almost the same price as the electromagnetic equipment. This reasonable price level is the result of the development of large capacity memory element and IC.

1-3 Status Quo in Bolivia

Presently, in Bolivia, the switching system composes the analog network, using the crossbar and step by step equipments. The transmission and radio systems also compose the analog network. Therefore, when introducing the digital technology, the country must solve such problems as mentioned below.

In the aspect of operation and maintenance staff:

(1) Part of engineers and technicians proficient in the analog technology must be re-educated so that they can be acquainted with the digital technology also.

In the technical aspect:

(2) How to realize the interface with the existing analog network?

(3) How to fulfill the trouble shooting for fine electronic parts? How to carry out the software maintenance?

(4) Which, the digital switching equipment or the digital transmission/radio equipment, to introduce first?

In the aspect of national environmental conditions:

(5) The highly reliable commercial power supply is difficult to obtain.

The problems mentioned in Items (1) through (5) above are common to all countries, including Bolivia, which will newly introduce the digital technology. The solution, however, is technically possible, and fully possible, though it is costly to some extent.

In the next section, a detailed study will be made with regard to the problems underlying the introduction of digital technology.

2. Detailed Study of Problems

2-1 Training

The maintenance and operation of digital equipment are easier than in the case of conventional electromagnetic equipment. The method is simple.

In the case of digital switching equipment, for instance, the person in charge of maintenance and operation has only to communicate in the prescribed form with the equipment, using the input/output device, such as the typewriter. The person in charge is not required to have any specific knowledge about digital technology.

Hence, for the maintenance and operation personnel, a four-month training, mainly about the way to manipulate the input/output device, will be sufficient. Trainees may be the young persons without previous experience in the handling of crossbar and step by step equipments.

The training is first provided by the contractor. After the completion of this training, special training courses, using the training-purpose equipment, will be held periodically in Bolivia. Such special training courses are to obtain the required number of maintenance and operation personnel.

2-2 Interface with Existing Analog Network

For the transmission network, the immediate work objective is to expand the existing analog network. This arrangement is in consideration of technical affairs involved in the interface between the digital network and the existing analog network.

On the other hand, for the switching equipment, the digital equipment will be adopted from the first, taking a step forward to the eventual digital network. At the interface point between the digital switching equipment and the analog transmission network, the analog to digital signal conversion will be carried out. The analog-digital converter is a kind of PCM terminal equipment.

2-3 Trouble Shooting, Software Maintenance

At the telephone exchange, the minimum replacement unit for faulty parts is the printed circuit board (PCB). The replacement is made, using the spare PCB.

Faulty PCB are sent by air to the original manufacturer and, at the manufacturer's factory, are repaired after precision tests.

For the purpose of trouble shooting, ENTEL may have an in-house repair plant established, where all necessary measuring equipment and instruments for inspection and repair are available. This plan, however, is not advisable economically because the probability of faults is so small that the most part of repair plant investment will remain idle.

Software maintenance comprises two major categories. One is the system file alteration and related affairs pursuant to the system modification and supplement, and is to be taken care of by the original manufacturer. The other is the alteration of exchange office data and subscriber data, which is to be done in Bolivia.

The data alteration is performed by means of the exchange office typewriter. Confirmation of changed data is made by use of the training-purpose switching equipment. The training-purpose switching equipment, besides being used for training of maintenance/operation personnel, is also the software center requisite to make the data register and to verify it.

2-4 Schedule for Introducing Digital Equipment

As previously stated, the transmission system improvement will be made in the form of expansion of the existing analog network, for the time being. This is because of technical implications relating to the digital-analog system interface.

For the switching equipment, the digital system will be introduced positively from the outset of the Project. For, in this case, no major technical difficulty is envisaged in the digital-analog system interface; furthermore, the digital system makes it easy to realize new services.

A detailed schedule of digital network formation as the ultimate objective will be described in the next Paragraph 3.

2-5 Stable Power Supply Establishment

The electronic switching equipment is vulnerable to the power supply interruption, so that the stable power supply without even the short break is indispensable for this equipment.

Emergency-use diesel engine generator and batteries will be used to compensate for unstable power supply. Where the commercial power supply is extremely unstable, or time restrictions are imposed on the commercial power supply, or the commercial power supply is not available, two sets of diesel engine generators will be used to obtain the required power supply.

3. Digital System Introduction Schedule

3-1 Work Stages

With a view to accomplishing the integrated digital telecommunication network eventually, the digital system will be introduced in three stages. More precisely:

First Stage: For the transmission system, the network expansion with analog equipment is the immediate objective.
For the switching system, the digital switching equipment will be installed in the exchanges to be newly established.
Since the existing equipment is the analog type, the analog and digital types will co-exist at the first stage.

Second Stage: The transmission system is still composed of analog equipment.
All the switching equipment will be the digital type.

Third Stage: Digital equipment will be introduced in the transmission system. The analog transmission network continues to exist.
The digital network will be overlaid on the analog network.

The network transition from the first through third stages is illustrated in Figure I-1.

3-2 Concrete Steps in First Stage

To attain the first stage objective in the eventual integrated digital network formation, 12 new exchanges with digital switching equipment will be constructed.

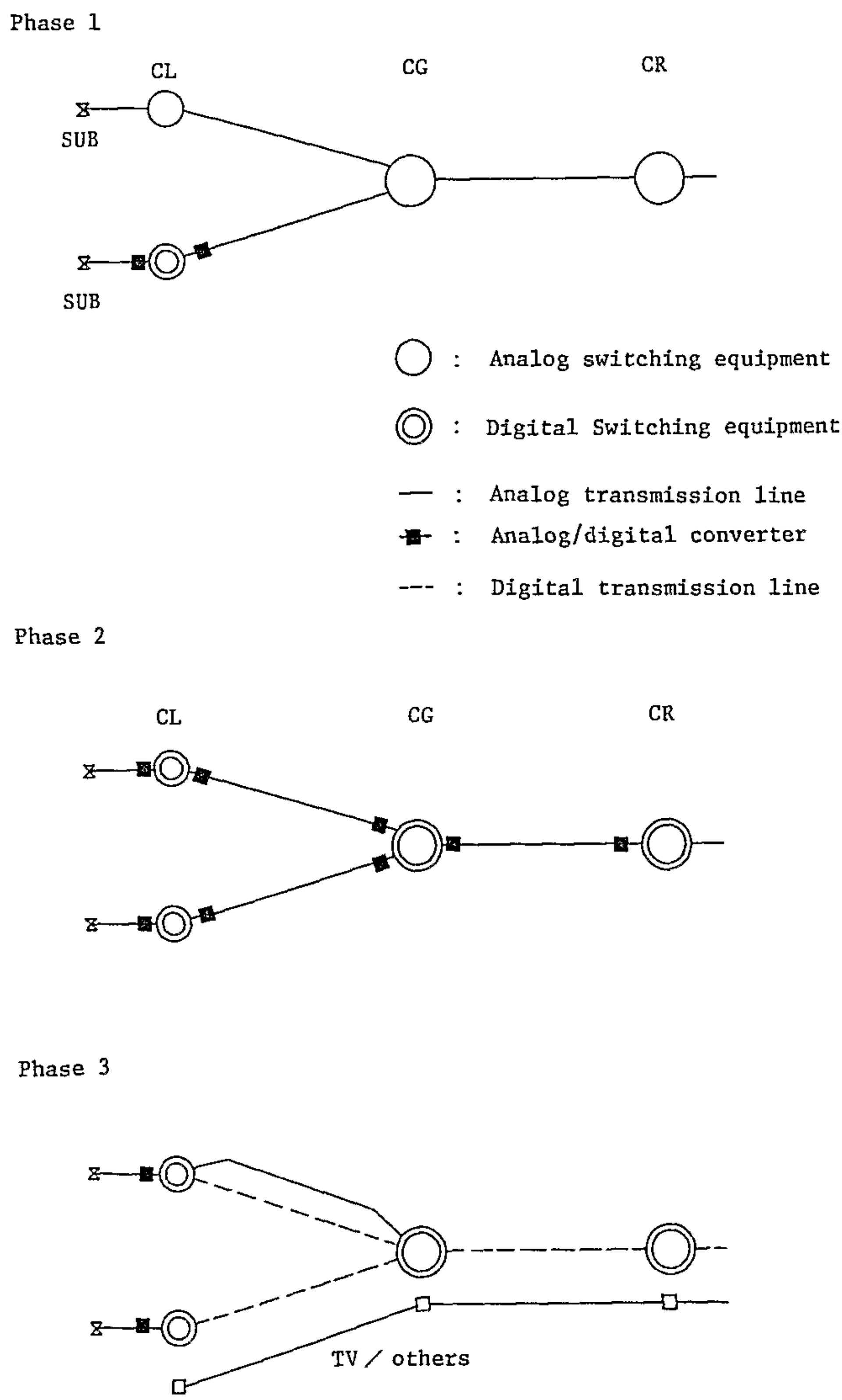


Fig. I-1 Phase by Phase Transition to Digital Network

With this, the concrete steps must be taken for the training of maintenance and operation personnel and for the establishment of maintenance and operation system. Details of those concrete steps are described below.

3-2-1 Maintenance and Operation System

A typical example of maintenance and operation system appears in Figure I-2. Since the digital equipment differs in the basic technology from the analog equipment, the division to take charge of the digital equipment should preferably be organized separately from the division in charge of the analog equipment.

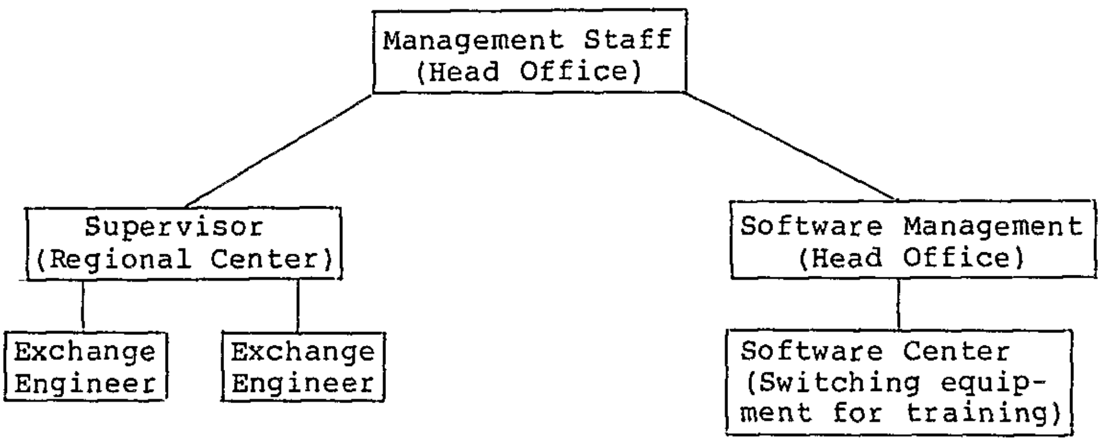


Fig. I-2 Typical Example of Maintenance and Operation System

- Exchange Engineer

  To be stationed in each telephone exchange and to assume the actual maintenance and operation duty.

- Supervisor

  To be stationed in each regional center and to assume duty that includes the check and recording of the number of equipment, fault discovery and remedial action, and traffic statistics making and updating.

- Management Staff

  To be stationed in the head office and to assort and arrange the data reported from each regional center. Also, to take care of faulty packages sent from various telephone exchanges.

- Software Management Staff

  To be stationed in the head office and to assume duty relating to the software management. Also, to make and verify data programs with the software center (training-use equipment).

3-2-2 Training

(1) Classification of Training

For the purpose of organizing the maintenance and operation system, two different training courses may be considered. One is to train administrators and supervisors with regard to the maintenance and operation management. The other is to train exchange engineers concerning the maintenance and operation work in which they are actually to be engaged.

(2) Subjects of Training

1) Training on management work

Period: 2 months

- Basic training

  Subject: System configuration, digital system concept, outline of project

- Software training

- Management work training

  Subjects: Traffic measurement practices, fault analysis, statistics processing practices, etc.

2) Training on routine maintenance and operation work

Period: 4 months

- Training on hard ware formation

  Subjects: Central control system, speech path, power supply equipment, input/output equipment

- Training on software formation

  Subjects: Call processing, diagnosis processing, fault processing

- Training on maintenance and operation practices

  Subjects: System control, performance monitoring, fault search, exchange data alteration for subscriber, etc.

(3) Switching Equipment for Training Purpose

Switching equipment of the same type as one operating in the exchange is to be provided for the training purpose. This switching equipment, besides being used for the purpose of training, is used as the software center also to make and verify new programs and data.

3-2-3 Establishment of New Technical Criteria

Technical criteria exclusively applicable to digital technology must be established. To be considered for such technical criteria are:

(1) Review of domestic transmission loss distribution

(2) Signalling system (such as adoption of common wire signalling system)

(3) Synchronizing system

(4) Review of tariff system pursuant to the introduction of new services

(5) New services to be introduced

(6) Review of numbering plan with the demand for ISDN considered

(7) Provision standard for remote concentration equipment and remote multiplexing equipment

4. Conclusion

The foregoing study of basic problems involved in the introduction of digital technology indicates that the solution to those problems is fully possible technically. Considering that the introduction of digital equipment is becoming the worldwide trend, the recommendation is herein made to the effect that in Bolivia also the digital equipment be positively introduced. By this means, the country will be able to keep in pace with, without lagging behind, the rest of the world in the technical evolution in the near future.

ANNEX - II

Telephone Demand Forecast

1. Model Formula of Demand Forecast
2. Population Forecast

ANNEX-II TELEPHONE DEMAND FORECAST

1. Model Formula of Demand Forecast

The study is made here about the correlation formula between GNP per capita (in U.S. dollars) and the number of telephones used per population of 100 (telephone density). In this study, the data of various countries are used as reference. Such data include:

"World Telephone (1975-1979)" published by ATT
"World Development Report (1975-1979)" published by World Bank

(1) By the correlation formula between GNP and telephone density in Bolivia

As seen in Table II-1, the past data are so lacking that the correlation formula to forecast the future cannot be obtained from them.

Table II-1 GNP and Telephone Density in Bolivia

	1975	1976	1977	1978	1979
GNP/Capita (US$)	-	-	390.0	630.0	510.0
Telephone density/ 100 persons	-	-	-	2.0	2.5

(2) By the correlation formula between GNP and telephone density in each country of South America

Figures vary from country to country to such an extent that no correlation exists. Hence, the forecast formula is incomplete. (Refer to table II-2 and Figure II-1.)

Table II-2 GNP and Telephone Density (1979) in Each Country of South America

Country	GNP (US$)	Tele. Density
Argentina	1910.0	1.0
Bolivia	510.0	2.5
Brazil	1570.0	4.7
Chile	1410.0	4.8
Colombia	850.0	5.6
Ecuador	880.0	3.0
Paraguay	850.0	1.8
Peru	740.0	.5
Uruguay	1610.0	9.6
Venezuela	2910.0	6.1
		(per/100 persons)

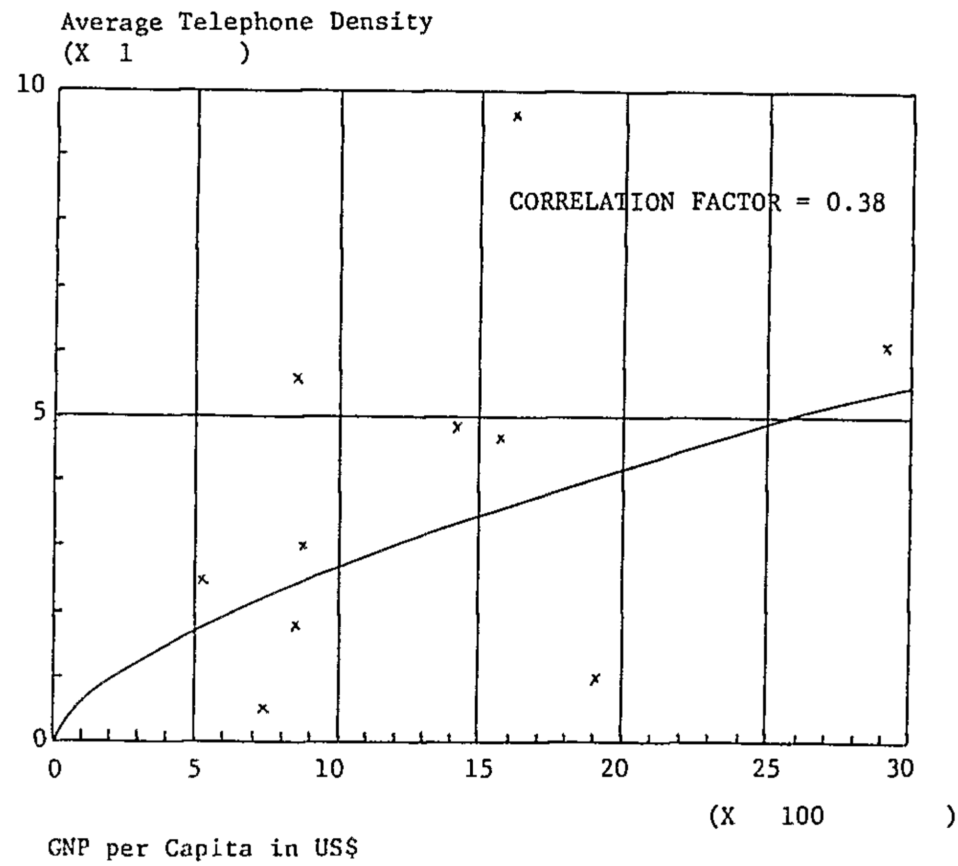


Fig. II-1 GNP and Telephone Density (1979) in Each Country of South America

(3) By the correlation formula between GNP and telephone density in 92 countries of the world

The correlation formula between GNP and telephone density obtained from Table II-3 by the method of least square follows:

$$\log q = -3.6142 + 1.341 \log X$$

where

- q: Telephone density (number of telephones used) per population of 100
- X: GNP per capita (in US$)

The correlation formula above obtained from the figures of 92 countries as of 1979 hold ample correlation as seen in Figure II-2. Therefore, the correlation formula that they produce is considered to be fit for telephone demand forecast.

Assume that the telephone density (number of telephones used per 100 persons) in Bolivia as of 1979 is 2.5. When the correlation formula quoted above is corrected by 2.5, the following model formula for this Project can be obtained:

$$\log q = -3.2329 + 1.341 \log X$$

2. Population Forecast

The total population in Bolivia is forecasted by the logistic curve from Table 3-4 (population in 1975-1979). Then, the population in each province of the country is forecasted by the following method:

Table II-3 (1/3) GNP and Telephone Density (1979) in 92 Countries

Country	GNP (US$)	Tel. Density
Afganistan	240.0	.2
Bangladesh	90.0	.1
China (Taiwan)	1400.0	12.2
Hong Kong	3040.0	29.3
India	180.0	.4
Indonesia	360.0	.3
Israel	3500.0	27.5
Japan	7280.0	45.8
Korea	1160.0	6.5
Kuwait	14890.0	13.9
Malaysia	1090.0	3.3
Mongolian	940.0	2.5
Nepal	120.0	.1
Pakistan	230.0	.5
Philippines	510.0	1.2
Saudi Arabia	7690.0	2.5
Singapore	3290.0	23.0
Sri Lanka	190.0	.6
Syrian Arab Rep.	930.0	2.5
Thailand	490.0	.9
Australia	7990.0	43.7
New Zealand	4790.0	56.0
Papua New Guinea	560.0	1.4
Canada	9180.0	63.6
United States	9590.0	77.0
Costa Rica	1540.0	8.2
Dominican Rep.	910.0	2.9
El Salvador	660.0	1.4
Guatemala	910.0	1.5
Haiti	260.0	.5
Honduras	480.0	.7
Jamaica	1110.0	5.9
Mexico	1290.0	6.0
Panama	1290.0	9.0

Table II-3 (2/3) GNP and Telephone Density in 92 Countries

Country	GNP (US$)	Tele. Density
Trinidad & Tobago	2910.0	6.9
Argentina	1910.0	1.0
Bolivia	510.0	2.5
Brazil	1570.0	4.7
Chile	1410.0	4.8
Colombia	850.0	5.6
Ecuador	880.0	3.0
Paraguay	850.0	1.8
Peru	740.0	.5
Uruguay	1610.0	9.6
Venezuela	2910.0	6.1
Austria	7030.0	34.1
Belgium	9090.0	33.2
Bulgaria	3230.0	11.6
Czechoslovakia	4720.0	19.6
Denmark	9920.0	56.5
Finland	6820.0	44.7
France	8260.0	37.2
German Dem. Rep.	5710.0	17.6
Germany, Fed.	9580.0	40.4
Greece	3250.0	26.5
Hungary	3450.0	10.7
Ireland	3470.0	16.7
Italy	3850.0	30.1
Netherlands	8410.0	45.3
Norway	9510.0	40.2
Poland	3670.0	8.8
Portugal	1990.0	12.7
Spain	3470.0	28.0
Sweden	10210.0	74.4
Switzerland	12100.0	68.1
Turkey	1200.0	3.6
United Kingdom	5030.0	44.7
U.S.S.R.	3700.0	8.0

Table II-3 (3/3) GNP and Telephone Density in 92 Countries

Country	GNP (US$)	Tele. Density
Yugoslavia	2380.0	7.5
Algerian	1260.0	1.9
Angola	300.0	.5
Chad	140.0	.1
Egypt	390.0	1.2
Ethiopia	120.0	.3
Ivory Coast	840.0	1.1
Kenya	330.0	1.1
Malawi	180.0	.5
Morocco	670.0	1.1
Mozambique	140.0	.4
Niger	220.0	.2
Nigeria	560.0	.2
Rhodesia	480.0	2.9
Senegal	340.0	.8
Sierre Leone	210.0	.3
South Africa	1480.0	10.1
Sudan	320.0	.3
Rwanda	180.0	.1
Upper Volta	160.0	.0
Uganda	280.0	.4
Togo	320.0	.3
Zambia	480.0	1.0
Tunisia	950.0	2.6

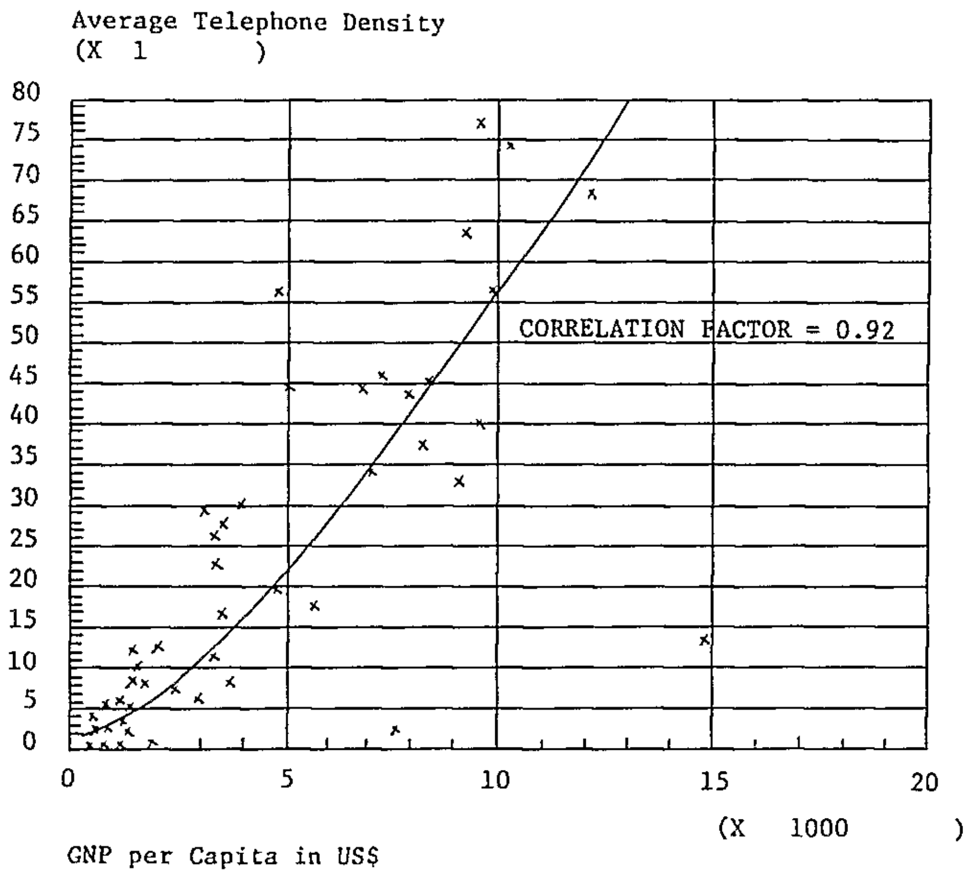


Fig. II-2 GNP and Telephone Density (1979) in 92 Countries

$$\begin{pmatrix}\text{Population}\\ \text{in each}\\ \text{province}\end{pmatrix} = \begin{pmatrix}\text{Macroscopic}\\ \text{forecast}\end{pmatrix} \times \begin{pmatrix}\text{Population}\\ \text{ratio of}\\ \text{each province}\end{pmatrix} + \begin{pmatrix}\text{Inter-province}\\ \text{migration of}\\ \text{population}\end{pmatrix}$$

Macroscopic forecast: Forecast by logistic curve from the past records

Population ratio of each province:
Forecast based on the ratio in the 1976 national census and by study of provincial development trends such as city planning

Inter-province migration of population:
Forecast based on the average migration of population during 1971-1976
(Refer to "Bolivia en Cifras 1980.")

For the economic development trend of Bolivia, it can be forecasted that the agriculture-centered development will spread from the high land region to the undeveloped plain land region. And, in this forecast, it is assumed that the migration of population will take place to the plain land region centering upon Santa Cruz. (Refer to Table II-4.)

Table II-4 Province by Province Population Forecast

Province	Area (Mm^2)	1976		1985			1990			1995			2000		
		Population	Ratio	Macro x Ratio	Migration	Population	Macro x Ratio	Migration	Population	Macro x Ratio	Migration	Population	Macro x Ratio	Migration	Population
			%												
LA PAZ	134.0	1,596,549	31.8	1,868,300	- 2,200	1,866,100	1,990,600	- 2,300	1,988,300	2,128,900	- 2,400	2,126,500	2,270,400	- 2,700	2,267,700
ORURO	53.6	338,315	6.7	374,800	- 2,100	372,700	400,700	- 2,300	398,400	427,200	- 2,400	424,800	454,100	- 2,700	451,400
COCHA-BAMBA	55.6	785,707	15.6	928,200	- 1,200	927,000	1,008,200	- 1,300	1,006,900	1,092,500	- 1,400	1,091,100	1,180,600	- 1,500	1,179,100
CHUQUI-SACA	51.5	390,592	7.8	464,100	- 2800	461,300	504,100	- 3,000	501,100	546,200	- 3,200	543,000	590,300	- 3,500	586,800
POTOSI	118.2	716,838	14.3	821,100	- 5,500	815,600	872,500	- 5,700	866,800	924,400	- 6,400	918,000	983,800	- 7,000	976,800
TARIJA	37.6	204,092	4.1	249,900	+ 1,700	251,600	271,500	+ 1,800	273,300	301,100	+ 1,900	303,000	325,400	+ 2,000	327,400
SANTA CRUZ	370.6	774,648	15.4	981,700	+13,100	994,800	1,118,100	+13,900	1,132,000	1,253,500	+15,100	1,268,600	1,392,600	+16,600	1,409,200
PANDO	63.8	37,199	0.7	41,700	+ 400	42,100	51,700	+ 400	52,100	56,000	+ 400	56,400	68,100	+ 500	68,600
BENI	213.6	182,980	3.6	220,100	- 1,400	218,700	245,600	- 1,500	244,100	273,100	- 1,600	271,500	302,700	- 1,700	301,000
Total	1098.5	5,026,918	100			5,949,900			6,463,000			7,002,900			7,568,000

ANNEX - III

Telephone Traffic Data

1. Existing Traffic Records
   (Rural Offices)

2. Existing Traffic Records
   (Local Offices)

3. Average Duration of Calls

4. Existing Lost Call Ratio Due to
   Poor Facilities

Table III-1(1/2) Existing Traffic Records (Rural Offices)

EXISTING OFFICE	NO. OF CALLS PER MONTH	REMARKS
SAN RORENZO (TARIJA)	(IN)* 63 (OUT)* 43	* QUANTITY OF LETTERS/MONTH POPULATION: APPROX. 2,400 MAG.
CONCEPCION (TARIJA)	(IN) 140 (OUT)	RADIO & MAG. POPULATION: APPROX. 1,700
PADCAYA (TARIJA)	(IN) 700 (OUT)	RADIO & MAG. POPULATION: APPROX. 1,200
ENTRE RIOS (TARIJA)	(IN) 100 (OUT) 100	RADIO & MAG. POPULATION: APPROX. 3,000
CARAPARI (TARIJA)	(IN) 23 (OUT) 20	MAG. POPULATION: APPROX. 2,200
CHARAGUA (TARIJA)	(IN) 60 (OUT)	RADIO POPULATION: APPROX. 4,700
LANGUNILLAS (TARIJA)	(IN) 30 (OUT) 20	MAG. & RADIO POPULATION: APPROX. 1,800
VACA GUZMAN (TARIJA)	(IN) 40 (OUT) 25	RADIO & MAG. POPULATION: APPROX. 6,000
MONTEAGUDO (TARIJA)	(IN) 400 (OUT) 600	RADIO & MAG. POPULATION: APPROX. 4,000
PADILLA (SUCRE)	(IN) 130 (OUT) 130	RADIO & MAG. POPULATION: APPROX. 11,000

Table III-1(2/2) Existing Traffic Records (Rural Offices)

EXISTING OFFICE	NO. OF CALLS PER MONTH	REMARKS
ZUDAÑEZ (SUCRE)	(IN) 60 (OUT) 60	MAG. POPULATION: APPROX. 7,000
UNCIA (ORURO)	(IN) (OUT) 40	RADIO & MAG. POPULATION: APPROX. 2,000
CHALLAPATA (ORURO)	(IN) 55 (OUT) 95	RADIO & MAG. POPULATION: APPROX. 4,000
QUIME (ORURO)	(IN) (OUT) 35	MAG. POPULATION: APPROX. 3,000
ACHACACHI (LA PAZ)	(IN) (OUT) 700	RADIO & MAG. POPULATION: APPROX. 4,200
COROCORO (LA PAZ)	(IN) 240 (OUT) 500	MAG. POPULATION: APPROX. 6,300

TOTAL NO. OF CALLS (IN) 1979 Average / site : 124

(OUT) 2430 Average / site : 152

NOTE: (NO. OF CALLS) is including calls of telephone service, telegraph service and message service.

Table III-2 Existing Traffic Records (Local Offices)

EXISTING OFFICE	NO. OF CALLS PER MONTH	REMARKS
BERMEJO (TARIJA)	* IOT: 15.4^{erl} (Estimate) TOLL (IN): 4.5^{erl} (") (OUT): 4^{erl} (") TOLL (IN) **400 (OUT) 800	Under Construction XB-ARF/SL-P1 (ERICSSON DO BRASIL) 600T POPULATION: APPROX. 13,000 * ESTIMATED FROM EQUI'T PROVISION ** FROM DGT OFFICE
YACUIBA (TARIJA)	TOLL (IN) 600 (OUT) 1,520 TELEGRAPH 760	ENTEL RADIO, MAG. POPULATION: 11,000
VILLA MONTES (TARIJA)	TOLL (IN) 300 (OUT) 300 TELEGRAPH (IN) 300 (OUT) 300	DGT, RADIO, MAG. POPULATION: APPROX. 7,000
CAMIRI (TARIJA)	IOT:* 19^{erl} (BH) ** TOLL (IN): 1,630 (OUT): 2,880 TELEGRAPH (IN): 480 (OUT): 504	AC251 (1967.10) 800T * ESTIMATED BY OBSERVATION OF SUPERVISING LAMPS ** BY ENTEL OFFICE
SANTA CRUZ (SANTA CRUZ)	LOCAL: OG: *** 10,368 (BHC) Calls (complete ratio 40%)	ACC 400 only: 22,000T *** CALCULATED

Table III-3 Average Duration of Calls

	CALLS	TOTAL	AVERAGE
YACUIBA	74	316 Min.	4.3 Min.
CAMIRI	OG: 120 IC: 68	467 Min. 295 Min	3.9 Min 4.3 Min

* Average duration of Calls may be 4.5 Minutes. (270 seconds) including dialling.

Table III-4 Existing Lost Call Ratio due to Poor Facilities

	OFFERE CALLS	LOST CALLS	LOST CALL RATIO
BERMEJO	1200	400	33.3%
YACUIBA	130	62	47.6%
CAMIRI	120	22	18.3%
CHARAGUA	60	30	50.0%

* Traffic will increase 20% - 50% (average 35%) by the improvement of facilities, excluding the effect of Auto-Dialling.

ANNEX - IV

Elevation and Coordinates of Station Sites

and

Path Distance and Azimuth Angle

Table LA-1 Elevation and Coordinates of Station Site

No.	Site Name	Elevation (m)	Coordinates	
			Longitude	Latitude
1	LA PAZ	3660	68°08'06"W	16°29'18"S
2	EL ALTO	4160	68°09'55"W	16°28'16"S
3	CHACALTAYA	5300	68°07'42"W	16°20'57"S
4	Cerro VALENCIANI	4920	68°01'18"W	16°20'00"S
5	C.CHUSPI PATA	3360	67°49'51"W	16°16'46"S
6	Cerro UCHUMACHI	2400	67°42'46"W	16°13'02"S

Table LA-2 Path Distance and Azimuth Angle

No.	Radio Path	Distance (km)	Azimuth	
			Forward	Backward
1	LA PAZ EL ALTO	3.7	300°31'	120°31'
2	EL ALTO CHACALTAYA	14.0	16°18'	196°18'
3	CHACALTAYA Cerro VALENCIANI	11.5	81°17'	261°15'
4	Cerro VALENCIANI C.CHUSPI PATA	21.2	73°44'	253°40'
5	C.CHUSPI PATA Cerro UCHUMACHI	14.4	61°24'	241°22'

Table LA-3 Elevation and Coordinates of Station Site

No.	Site Name	Elevation (m)	Coordinates	
			Longitude	Latitude
1	Cerro UCHUMACHI	2400	67°42′46"W	16°13′02"S
2	COROICO	1750	67°43′30"W	16°11′05"S
3	Cerro TORINI	2530	67°33′49"W	16°23′21"S
4	CHULUMANI	1800	67°31′38"W	16°24′24"S
5	Rep. COPACABANA	4370	69°02′35"W	16°08′07"S
6	COPACABANA	3850	69°05′07"W	16°09′52"S
7	Cerro CACHACA	4700	68°17′36"W	17°13′38"S
8	CHACALTAYA	5300	68°07′42"W	16°20′57"S
9	C.CHAQUE CHUANI	4080	68°38′13"W	16°06′54"S
10	ACHACACHI	3825	68°41′00"W	16°02′25"S

Table LA-4 Path Distance and Azimuth Angle

No.	Radio Path	Distance (km)	Azimuth	
			Forward	Backward
1	Cerro UCHUMACHI COROICO	3.8	340°02′	160°02′
2	Cerro UCHUMACHI Cerro TORINI	24.8	140°04′	320°01′
3	Cerro TORINI CHULUMANI	4.3	116°29′	296°29′
4	Rep. COPACABANA COPACABANA	5.5	234°26′	54°27′
5	Cerro CACHACA CHACALTAYA	98.7	10°17′	190°14′
6	CHACALTAYA C.CHAQUE CHUANI	60.2	295°25′	115°33′
7	C.CHAQUE CHUANI ACHACACHI	9.6	329°01′	149°02′

Table LA-5 Elevation and Coordinates of Station Site

No.	Site Name	Elevation (m)	Coordinates	
			Longitude	Latitude
1	Rep.COPACABANA	4370	69°02′35″W	16°08′07″S
2	MINA MATILDE	3850	69°02′18″W	15°47′12″S
3	HUARINA	3815	68°35′56″W	16°11′25″S
4	HUATAJATA	3815	68°42′02″W	16°12′23″S
5	GUAQUI	3820	68°50′06″W	16°35′37″S
6	DESAGUADERO	3820	69°00′30″W	16°33′44″S
7	Cerro CACHACA	4700	68°17′36″W	17°13′38″S
8	SICA SICA	3910	67°44′21″W	17°19′45″S
9	PATACAMAYA	3770	67°55′14″W	17°14′09″S
10	COROCORO	3980	68°27′06″W	17°10′20″S
11	Cerro TORINI	2530	67°33′49″W	16°23′21″S
12	CHOJLLA	2230	67°46′23″W	16°24′14″S
13	CORIPATA	1740	67°36′11″W	16°18′35″S

Table LA-6 Path Distance and Azimuth Angle

No.	Radio Path	Distance (km)	Azimuth	
			Forward	Backward
1	Rep.COPACABANA MINA MATILDE	38.5	0°45′	180°45′
2	Rep.COPACABANA HUARINA	47.8	97°22′	277°14′
3	Rep.COPACABANA HUATAJATA	37.4	102°10′	282°05′
4	Rep.COPACABANA GUAQUI	55.3	156°22′	336°18′
5	Rep.COPACABANA DESAGUADERO	47.3	175°31′	355°30′
6	Cerro CACHACA SICA SICA	59.9	100°55′	280°45′
7	Cerro CACHACA PATACAMAYA	39.6	91°26′	271°19′
8	Cerro CACHACA COROCORO	17.9	289°51′	109°54′
9	Cerro TORINI CHOJLLA	22.4	265°48′	85°52′
10	Cerro TORINI CORIPATA	9.7	334°23′	154°24′

Table OR-1 Elevation and Coordinates of Station Site

No.	Site Name	Elevation (m)	Coordinates	
			Longitude	Latitude
1	NEGRO PABELLON	4816	66°51′21"W	18°03′48"S
2	ORURO	3700	67°06′45"W	17°57′59"S
3	C. CALICHE	4530	66°49′55"W	18°15′56"S
4	HUANUNI	3930	66°50′00"W	18°17′03"S

Table OR-2 Path Distance and Azimuth Angle

No.	Radio Path	Distance (km)	Azimuth	
			Forward	Backward
1	NEGRO PABELLON ORURO	29.2	291°30′	111°35′
2	NEGRO PABELLON C. CALICHE	22.5	173°34′	353°33′
3	C. CALICHE HUANUNI	2.1	184°05′	4°05′

Table OR-3 Elevation and Coordinates of Station Site

No.	Site Name	Elevation (m)	Coordinates	
			Longitude	Latitude
1	NEGRO PABELLON	4816	66°51′21″W	18°03′48″S
2	Rep.LLALLAGUA	4560	66°35′49″W	18°27′00″S
3	LLALLAGUA	3890	66°35′02″W	18°25′08″S
4	CHAYANTA	3740	66°26′30″W	18°27′24″S
5	ORURO	3700	67°06′45″W	17°57′59″S
6	VETA BLANCA	4503	67°08′06″W	17°23′46″S

Table OR-4 Path Distance and Azimuth Angle

No.	Radio Path	Distance (km)	Azimuth	
			Forward	Backward
1	NEGRO PABELLON Rep.LLALLAGUA	50.8	147°26′	327°21′
2	Rep.LLALLAGUA LLALLAGUA	3.7	21°50′	201°50′
3	Rep.LLALLAGUA CHAYANTA	16.4	92°36′	272°33′
4	ORURO VETA BLANCA	63.1	357°50′	177°50′

Table OR-5 Elevation and Coordinates of Station Site

No.	Site Name	Elevation (m)	Coordinates	
			Longitude	Latitude
1	NEGRO PABELLON	4816	66°51′21"W	18°03′48"S
2	SANTA FE	4380	66°47′46"W	18°08′18"S
3	MOROCOCALA	4460	66°47′17"W	18°09′01"S
4	ANTIQUERA	4160	66°50′38"W	18°29′01"S
5	CHALLAPATA	3710	66°46′22"W	18°53′57"S
6	EQUALIPTOS	3700	67°30′29"W	17°35′32"S
7	CARACOLLO	3760	67°13′00"W	17°37′56"S

Table OR-6 Path Distance and Azimuth Angle

No.	Radio Path	Distance (km)	Azimuth	
			Forward	Backward
1	NEGRO PABELLON SANTA FE	10.4	142°43′	322°42′
2	NEGRO PABELLON MOROCOCALA	12.0	143°18′	323°17′
3	NEGRO PABELLON ANTIQUERA	46.5	178°27′	358°27′
4	NEGRO PABELLON CHALLAPATA	92.8	174°36′	354°34′
5	NEGRO PABELLON EQUALIPTOS	86.5	306°55′	127°07′
6	NEGRO PABELLON CARACOLLO	61.1	321°14′	141°20′

Table CO-1 Elevation and Coordinates of Station Site

No.	Site Name	Elevation (m)	Coordinates	
			Longitude	Latitude
1	Cerro TUTI	4183	65°51′24"W	17°27′14"S
2	Cerro CURUBANBA	4200	65°36′53"W	17°40′43"S
3	TUNTURI	3120	65°11′26"W	17°46′47"S
4	PUNATA	2700	65°50′02"W	17°32′29"S
5	SANTIVANES	2530	66°14′53"W	17°32′43"S
6	Rep.SANTIVANES	2940	66°13′06"W	17°36′25"S
7	CAPINOTA	2544	66°16′21"W	17°43′04"S

Table CO-2 Path Distance and Azimuth Angle

No.	Radio Path	Distance (km)	Azimuth	
			Forward	Backward
1	Cerro TUTI Cerro CURUBANEA	35.7	134°07′	314°02′
2	Cerro CURUBANBA TUNTURI	46.3	104°02′	283°54′
3	Cerro TUTI PUNATA	10.0	165°59′	345°58′
4	SANTIVANES Rep.SANTIVANES	7.5	155°12′	335°11′
5	Rep.SANTIVANES CAPINOTA	13.5	205°06′	25°07′

Table CO-3 Elevation and Coordinates of Station Site

No.	Site Name	Elevation (m)	Coordinates	
			Longitude	Latitude
1	Cerro TUTI	4183	65°51′24"W	17°27′14"S
2	TIRAQUE	3270	65°43′18"W	17°25′25"S
3	ARANI	2710	65°46′20"W	17°34′06"S
4	UCRENA	2700	65°54′22"W	17°34′41"S
5	CLIZA	2690	65°56′04"W	17°35′16"S
6	TARATA	2740	66°01′23"W	17°36′30"S
7	TUNTURI	3120	65°11′26"W	17°46′47"S
8	TOTORA	2770	65°11′23"W	17°43′53"S
9	AIQUILE	2380	65°10′49"W	18°11′07"S
10	MIZQUE	1910	65°20′23"W	17°56′31"S
11	JUNO	4658	65°41′32"W	17°19′13"S
12	PUERTO VILLAROEL	1900	64°47′31"W	16°49′57"S
13	VILLA TUNARI	429	65°24′36"W	16°57′45"S
14	COLOMI	3600	65°52′50"W	17°28′18"S

Table CO-4 Path Distance and Azimuth Angle

No.	Radio Path	Distance (km)	Azimuth	
			Forward	Backward
1	Cerro TUTI TIRAQUE	14.7	76°52′	256°50′
2	Cerro TUTI ARANI	15.5	144°43′	324°41′
3	Cerro TUTI UCRENA	14.7	200°54′	20°55′
4	Cerro TUTI CLIZA	16.9	209°07′	29°09′
5	Cerro TUTI TARATA	24.6	225°55′	45°58′
6	TUNTURI TOTORA	5.3	0°57′	180°57′
7	TUNTURI AIQUILE	44.9	178°37′	358°37′
8	TUNTURI MIZQUE	23.9	221°21′	41°23′
9	JUNO PUERTO VILLARCEL	109.9	60°44′	240°29′
10	JUNO VILLA TUNARI	49.6	37°13′	217°08′
11	JUNO COLOMI	26.1	230°02′	50°05′

Table PO-1 Elevation and Coordinates of Station Site

No.	Site Name	Elevation (m)	Coordinates	
			Longitude	Latitude
1	POTOSI	3940	65°45′14"W	19°35′02"S
2	ORCOLLO	4920	65°41′47"W	19°37′36"S
3	Cerro SANO	4708	65°56′35"W	20°05′10"S
4	Cerro REFORMA	4940	66°03′29"W	20°55′14"S
5	Cerro YUMIA	4110	65°43′42"W	21°35′49"S
6	TUPIZA	2980	65°42′59"W	21°26′42"S

Table PO-2 Path Distance and Azimuth Angle

No.	Radio Path	Distance (km)	Azimuth	
			Forward	Backward
1	POTOSI ORCOLLO	7.7	128°09′	308°07′
2	ORCOLLO Cerro SANO	57.0	206°53′	26°58′
3	Cerro SANO Cerro REFORMA	93.1	187°23′	7°25′
4	Cerro REFORMA Cerro YUMIA	82.3	155°30′	335°23′
5	Cerro YUMIA TUPIZA	16.9	4°13′	184°12′

Table PO-3 Elevation and Coordinates of Station Site

No.	Site Name	Elevation (m)	Coordinates	
			Longitude	Latitude
1	Cerro REFORMA	4940	66°03′29″W	20°55′14″S
2	Rep. UYUNI	4060	66°44′50″W	20°26′04″S
3	UYUNI	3650	66°49′29″W	20°27′27″S
4	ATOCHA	3750	66°13′25″W	20°55′53″S
5	Cerro YUMIA	4110	65°43′42″W	21°35′49″S
6	VILLAZON	3530	65°36′10″W	22°03′57″S
7	AGUADE CASTILLA	4280	66°18′19″W	20°56′60″S
8	SANTA ANA	3810	66°16′42″W	20°55′24″S
9	SIETE SUYOS	3960	66°17′41″W	20°56′45″S
10	QUECHISLA	3560	66°06′36″W	20°52′21″S
11	ORCOLLO	4920	65°41′47″W	19°37′36″S
12	BETANZOS	3400	65°27′26″W	19°32′57″S

Table PO-4 Path Distance and Azimuth Angle

No.	Radio Path	Distance (km)	Azimuth	
			Forward	Backward
1	Cerro REFORMA Rep. UYUNI	89.7	306°44′	126°58′
2	Rep. UYUNI UYUNI	8.5	252°28′	72°30′
3	Cerro REFORMA ATOCHA	17.2	265°59′	86°03′
4	Cerro YUMIA VILLAZON	53.5	165°59′	345°56′
5	Cerro REFORMA AGUADE CASTILLA	25.9	262°44′	82°49′
6	AGUADE CASTILLA SANTA ANA	4.1	43°31′	223°30′
7	AGUADE CASTILLA SIETE SUYOS	1.2	67°13′	247°12′
8	Cerro REFORMA QUECHISLA	7.6	314°33′	134°34′
9	ORCOLLO BETANZOS	26.5	71°10′	251°05′

Table PO-5 Elevation and Coordinates of Station Site

No.	Site Name	Elevation (m)	Coordinates	
			Longitude	Latitude
1	Cerro REFORMA	4940	66°03′29"W	20°55′14"S
2	TAZNA	4380	66°11′14"W	20°37′13"S
3	PULACAYO	4100	66°41′56"W	20°23′12"S
4	VETILLA			
5	TATASI	4440	66°09′16"W	21°10′23"S

Table PO-6 Path Distance and Azimuth Angle

No.	Radio Path	Distance (km)	Azimuth	
			Forward	Backward
1	Cerro REFORMA TAZNA	35.8	337°57′	158°00′
2	Cerro REFORMA PULACAYO	89.1	311°24′	131°37′
3	Cerro REFORMA VETILLA			
4	Cerro REFORMA TATASI	29.7	199°42′	19°44′

Table TA-1 Elevation and Coordinates of Station Site

No.	Site Name	Elevation (m)	Coordinates	
			Longitude	Latitude
1	TARIJA	1860	64°44′04"W	21°31′45"S
2	SAMA	3860	64°53′58"W	21°29′37"S

Table TA-2 Path Distance and Azimuth Angle

No.	Radio Path	Distance (km)	Azimuth	
			Forward	Backward
1	TARIJA SAMA	17.5	282°56′	103°00′

Table TA-3 Elevation and Coordinates of Station Site

No.	Site Name	Elevation (m)	Coordinates	
			Longitude	Latitude
1	CAMARGO	2400	65°12′31"W	20°38′15"S
2	BALCON	2950	65°11′35"W	20°43′48"S
3	Rep.PELILLOJO	3760	65°05′49"W	20°43′15"S
4	SAMA	3860	64°53′58"W	21°29′37"S
5	C.ALTO GRANDE	3200	64°35′42"W	21°58′12"S
6	C.CANDADO GRANDE	1050	64°22′53"W	22°36′58"S
7	CULPINA	2930	64°56′34"W	20°49′08"S
8	Rep.COTAGAITA	2900	65°38′47"W	20°48′18"S
9	PADACAYA	1990	64°42′44"W	21°53′05"S

Table TA-4 Path Distance and Azimuth Angle

No.	Radio Path	Distance (km)	Azimuth	
			Forward	Backward
1	CAMARGO BALCON	10.4	171°01′	351°00′
2	BALCON Rep.PELILLOJO	10.1	84°14′	264°12′
3	Rep.PELILLOJO SAMA	87.9	166°33′	346°29′
4	SAMA C.ALTO GRANDE	61.4	149°13′	329°06′
5	C.ALTO GRANDE C.CANDADO GRANDE	74.8	162°56′	342°51′
6	Rep.PELILLOJO CULPINA	19.4	124°06′	304°02′
7	Rep.PELILLOJO Rep.COTAGAITA	57.9	260°39′	80°51′
8	C.ALTO GRANDE PADACAYA	15.3	307°55′	127°58′

Table TA-5 Elevation and Coordinates of Station Site

No.	Site Name	Elevation (m)	Coordinates	
			Longitude	Latitude
1	SAMA	3860	64°53′58"W	21°29′37"S
2	SAN LORENZO	2010	64°44′51"W	21°24′52"S
3	CONCEPCION	1710	64°39′01"W	21°41′30"S
4	PADCAYA	1990	64°42′44"W	21°53′05"S
5	BALCON	2950	65°11′35"W	20°43′48"S
6	VILLA ABECIA	2300	65°13′41"W	20°58′16"S
7	LAS CARRERAS	2560	65°13′04"W	21°11′58"S

Table TA-6 Path Distance and Azimuth Angle

No.	Radio Path	Distance (km)	Azimuth	
			Forward	Backward
1	SAMA SAN LORENZO	18.0	60°56′	240°52′
2	SAMA CONCEPCION	33.8	130°24′	310°19′
3	SAMA PADCAYA	47.4	155°56′	335°52′
4	BALCON VILLA ABECIA	26.9	187°46′	7°47′
5	BALCON LAS CARRERAS	52.0	182°50′	2°50′

Table TA-(2/2)-1 Elevation and Coordinates of Station Site

No.	Site Name	Elevation (m)	Coordinates	
			Longitude	Latitude
1	SANA	1780	63°38′19"W	21°39′42"S
2	TAIGUANTI	540	63°22′20"W	21°07′40"S
3	NANCORAINZA	765	63°16′51"W	20°41′18"S
4	HACIENDA HUACARETA	1020	63°16′24"W	20°12′39"S
5	Rep.CAMIRI	1820	63°33′47"W	20°03′53"S
6	CAMIRI	830	63°30′52"W	20°02′04"S

Table TA-(2/2)-2 Path Distance and Azimuth Angle

No.	Radio Path	Distance (km)	Azimuth	
			Forward	Backward
1	SANA TAIGUANTI	65.2	25°06′	205°00′
2	TAIGUANTI NANCORAINZA	49.5	11°04′	191°02′
3	NANCORAINZA HACIENDA HUACARETA	52.8	0°51′	180°51′
4	HACIENDA HUACARETA Rep.CAMIRI	34.3	298°03′	118°09′
5	Rep.CAMIRI CAMIRI	6.1	56°37′	236°36′

Table TA-(2/2)-3 Elevation and Coordinates of Station Site

No.	Site Name	Elevation (m)	Coordinates	
			Longitude	Latitude
1	SANA	1780	63°38′19″W	21°39′42″S
2	YACUIBA	630	63°40′33″W	22°00′34″S
3	Rep.CAMIRI	1820	63°33′47″W	20°03′53″S
4	Cerro ASTILLERO	2080	64°00′00″W	19°42′36″S
5	MONTEAGUDO	1000	63°57′10″W	19°47′47″S
6	CHARAGUA	780	63°12′03″W	19°47′17″S
7	BOYUIBE	800	63°16′40″W	20°25′43″S

Table TA-(2/2)-4 Path Distance and Azimuth Angle

No.	Radio Path	Distance (km)	Azimuth	
			Forward	Backward
1	SANA YACUIBA	38.7	185°42′	5°43′
2	Rep.CAMIRI Cerro ASTILLERO	60.2	310°34′	130°43′
3	Cerro ASTILLERO MONTEAGUDO	10.8	152°39′	332°38′
4	Rep.CAMIRI CHARAGUA	48.7	51°08′	231°01′
5	Rep.CAMIRI BOYUIBE	50.1	143°33′	323°27′

Table TA-(2/2)-5 Elevation and Coordinates of Station Site

No.	Site Name	Elevation (m)	Coordinates	
			Longitude	Latitude
1	SANA	1780	63°38′19″W	21°39′42″S
2	SANANDITA	860	63°36′34″W	21°40′39″S
3	EL PALMAR	600	63°36′42″W	21°52′33″S
4	CARAPARI	770	63°44′24″W	21°49′31″S

Table TA-(2/2)-6 Path Distance and Azimuth Angle

No.	Radio Path	Distance (km)	Azimuth	
			Forward	Backward
1	SANA SANANDITA	3.5	120°09′	300°08′
2	SANA EL PALMAR	23.9	173°18′	353°18′
3	SANA CARAPARI	20.9	210°03′	30°05′

Table SU-1 Elevation and Coordinates of Station Site

No.	Site Name	Elevation (m)	Coordinates	
			Longitude	Latitude
1	C.SICA SICA	3118	65°14′34"W	19°03′08"S
2	SUCRE	2800	65°15′17"W	19°02′34"S
3	Rep.TARABUCO	3520	64°55′23"W	19°10′07"S
4	YAMPAREZ	3070	65°07′15"W	19°11′10"S

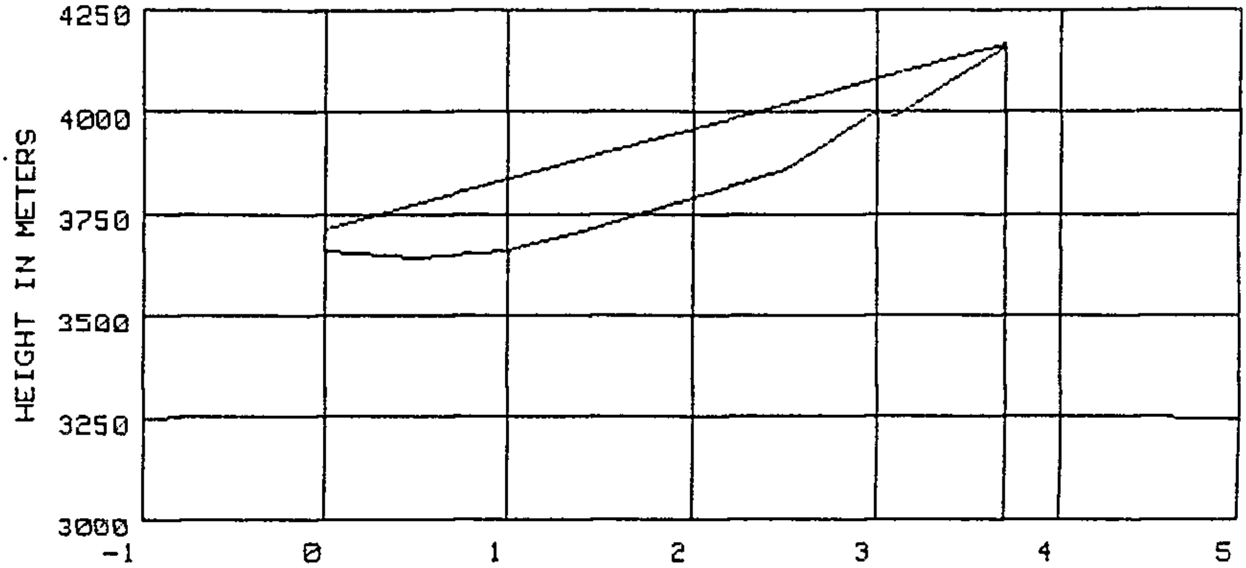
Table SU-2 Path Distance and Azimuth Angle

No.	Radio Path	Distance (km)	Azimuth	
			Forward	Backward
1	C.SICA SICA SUCRE	1.6	309°44′	129°45′
2	C.SICA SICA Rep.TARABUCO	36.0	111°00′	290°54′
3	C.SICA SICA YAMPAREZ	19.6	139°08′	319°06′

ANNEX - V

Path Profile Maps

PATH PROFILE (4/3 RADIUS)

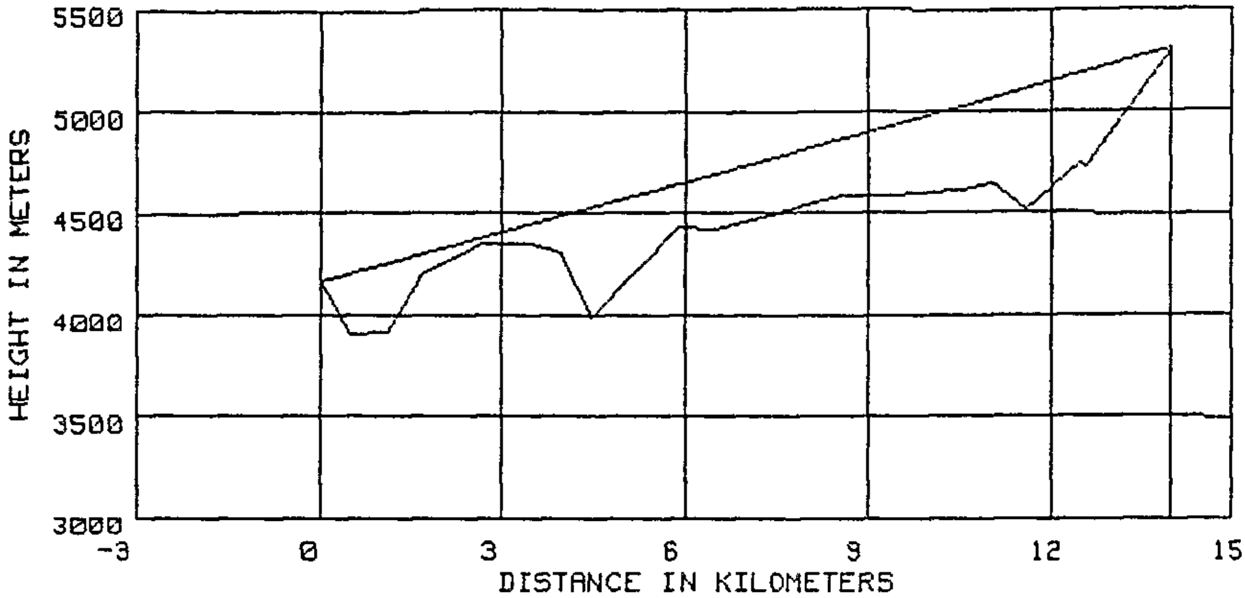


DISTANCE : 3.7 km

SITE 1 : LA PAZ	SITE 2 : EL ALTO
GROUND ELEVATION: 3660.0 m	GROUND ELEVATION: 4160.0 m
ANTENNA HEIGHT: 50.0 m	ANTENNA HEIGHT: 5.0 m

```
####################################################################
#                                                                  #
#                PATH CLEARANCE AND RIDGE LOSS                     #
#                                                                  #
#                                                                  #
#       K     =    1.33                                            #
#                                                                  #
#       F     =  6770 MHz :  (λ =    44  mm)                       #
#                                                                  #
#       Hg1   = 3660.0  m       Hg2   = 4160.0  m                  #
#       Ha1   =   50.0  m       Ha2   =    5.0  m                  #
#                                                                  #
#       D1    =    3.0 km       D2    =    0.7 km   Hm = 4010.0 m  #
#       U     =   13.72         Ld    =    0.0 dB                  #
#                                                                  #
#                                                                  #
#       Lfs   = 120.4 dB        Lfs + Ld  = 120.4 dB               #
#                                                                  #
#                                                                  #
####################################################################
```

PATH PROFILE (4/3 RADIUS)

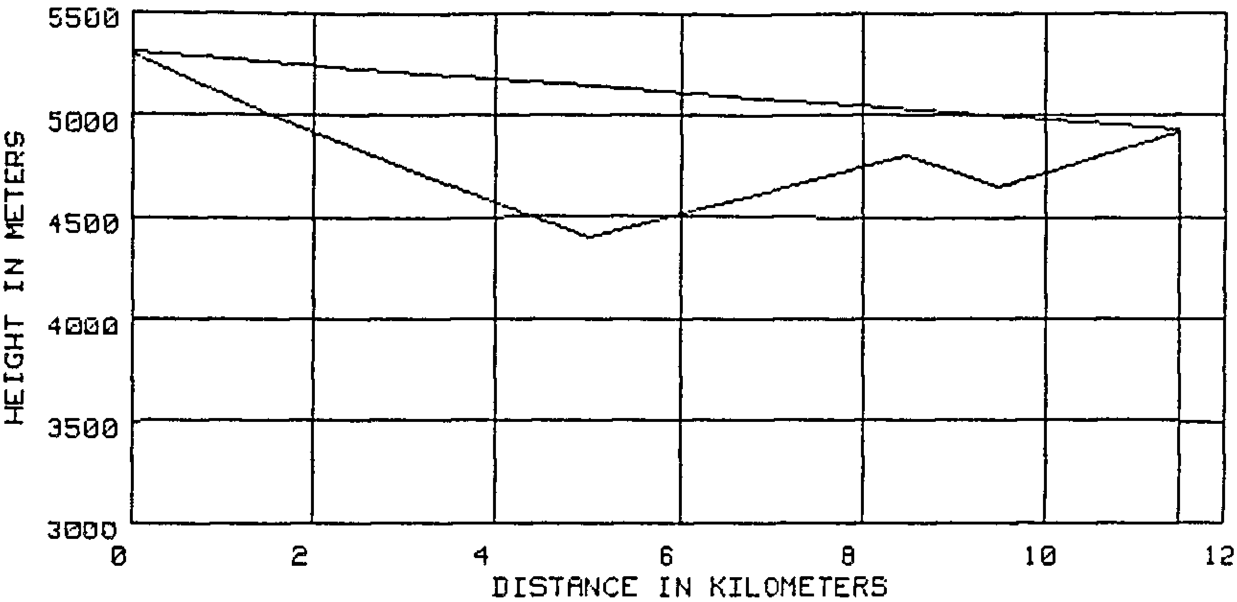


DISTANCE : 14.0 km

SITE 1 : EL ALTO		SITE 2 : CHACALTAYA	
GROUND ELEVATION:	4160.0 m	GROUND ELEVATION:	5300.0 m
ANTENNA HEIGHT:	5.0 m	ANTENNA HEIGHT:	10.0 m

```
##################################################################
#                                                                #
#                 PATH CLEARANCE AND RIDGE LOSS                  #
#                                                                #
#                                                                #
#      K     =     1.33                                          #
#                                                                #
#      F     =  6770 MHz :  (λ =    44 mm)                       #
#                                                                #
#      Hg1   = 4160.0  m       Hg2   = 5300.0  m                 #
#      Ha1   =    5.0  m       Ha2   =   10.0  m                 #
#                                                                #
#      D1    =     2.7 km      D2    =    11.3 km   Hm = 4350.0 m #
#      U     =     3.46        Ld    =     0.0 dB                #
#                                                                #
#                                                                #
#      Lfs   = 132.0 dB        Lfs + Ld  = 132.0 dB              #
#                                                                #
#                                                                #
##################################################################
```

PATH PROFILE (4/3 RADIUS)

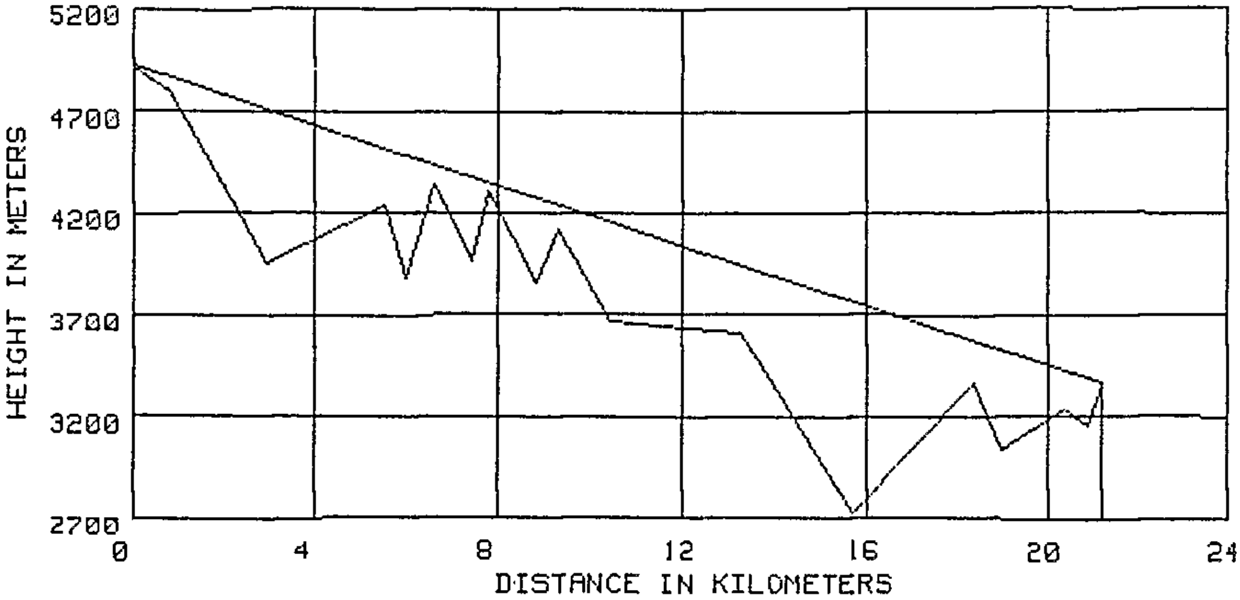


DISTANCE : 11.5 km

SITE 1 : CHACALTAYA	SITE 2 : Cerro VALENCIANI
GROUND ELEVATION: 5300.0 m	GROUND ELEVATION: 4920.0 m
ANTENNA HEIGHT: 10.0 m	ANTENNA HEIGHT: 10.0 m

```
###################################################################
#                                                                 #
#                 PATH CLEARANCE AND RIDGE LOSS                   #
#                                                                 #
#                                                                 #
#       K     =    1.33                                           #
#                                                                 #
#       F     =  6770 MHz :  (λ =    44 mm)                       #
#                                                                 #
#       Hg1   = 5300.0  m       Hg2  = 4920.0  m                  #
#       Ha1   =   10.0  m       Ha2  =   10.0  m                  #
#                                                                 #
#       D1    =    8.5 km       D2   =     3.0 km   Hm = 4800.0 m #
#       U     =   22.96         Ld   =     0.0 dB                 #
#                                                                 #
#                                                                 #
#       Lfs   = 130.3 dB        Lfs + Ld  = 130.3 dB              #
#                                                                 #
#                                                                 #
###################################################################
```

PATH PROFILE (4/3 RADIUS)



DISTANCE : 21.2 km

SITE 1 : Cerro VALENCIANI	SITE 2 : C.CHUSPI PATA
GROUND ELEVATION: 4920.0 m	GROUND ELEVATION: 3360.0 m
ANTENNA HEIGHT: 10.0 m	ANTENNA HEIGHT: 10.0 m

PATH CLEARANCE AND RIDGE LOSS

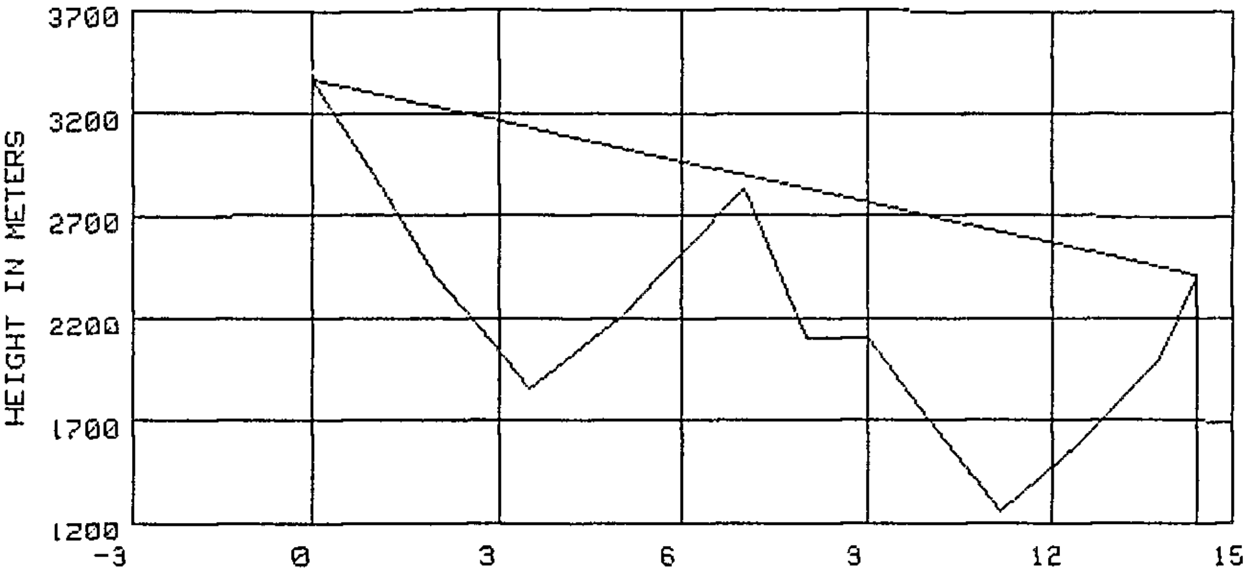
K = 1.33

F = 6770 MHz : (λ = 44 mm)

Hg1 = 4920.0 m	Hg2 = 3360.0 m	
Ha1 = 10.0 m	Ha2 = 10.0 m	
D1 = 7.8 km	D2 = 13.4 km	Hm = 4310.0 m
U = 2.70	Ld = 0.0 dB	

Lfs = 135.6 dB   Lfs + Ld = 135.6 dB

PATH PROFILE (4/3 RADIUS)



DISTANCE : 14.4 km

SITE 1 : C.CHUSPI PATA

GROUND ELEVATION: 3360.0 m

ANTENNA HEIGHT: 10.0 m

SITE 2 : Cerro UCHUMACHI

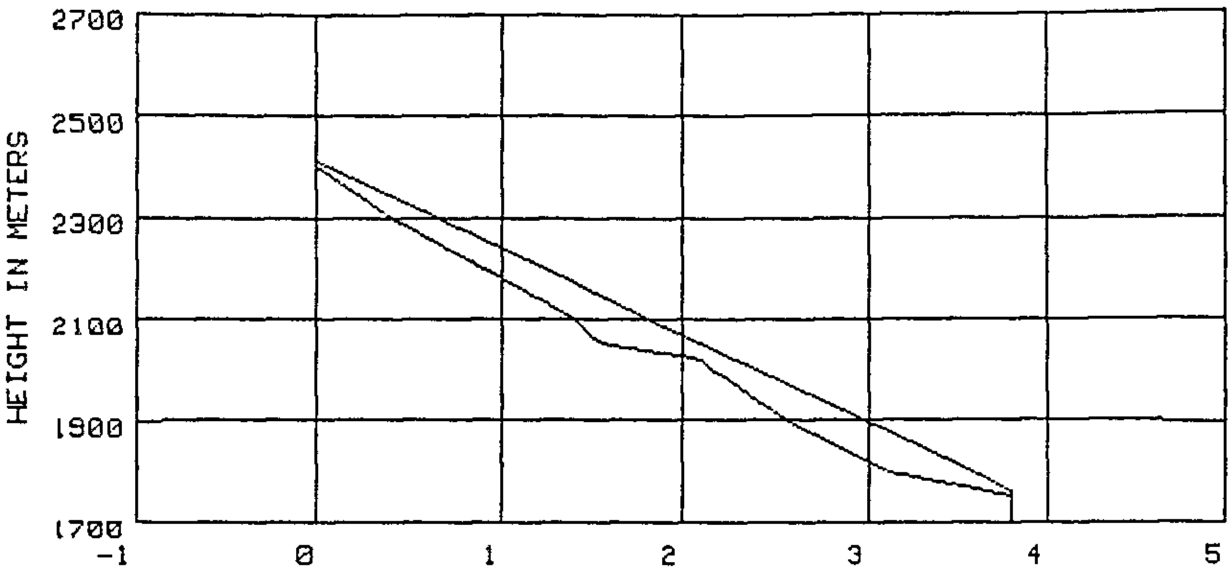
GROUND ELEVATION: 2400.0 m

ANTENNA HEIGHT: 10.0 m

PATH CLEARANCE AND RIDGE LOSS

K = 1.33				
F = 6770 MHz : (λ = 44 mm)				
Hg1 = 3360.0 m	Hg2 = 2400.0 m			
Ha1 = 10.0 m	Ha2 = 10.0 m			
D1 = 7.0 km	D2 = 7.4 km	Hm = 2850.0 m		
U = 3.98	Ld = 0.0 dB			
Lfs = 132.2 dB	Lfs + Ld = 132.2 dB			

PATH PROFILE (4/3 RADIUS)



DISTANCE : 3.8 km

SITE 1 : Cerro UCHUMACHI	SITE 2 : COROICO
GROUND ELEVATION: 2400.0 m	GROUND ELEVATION: 1750.0 m
ANTENNA HEIGHT: 10.0 m	ANTENNA HEIGHT: 10.0 m

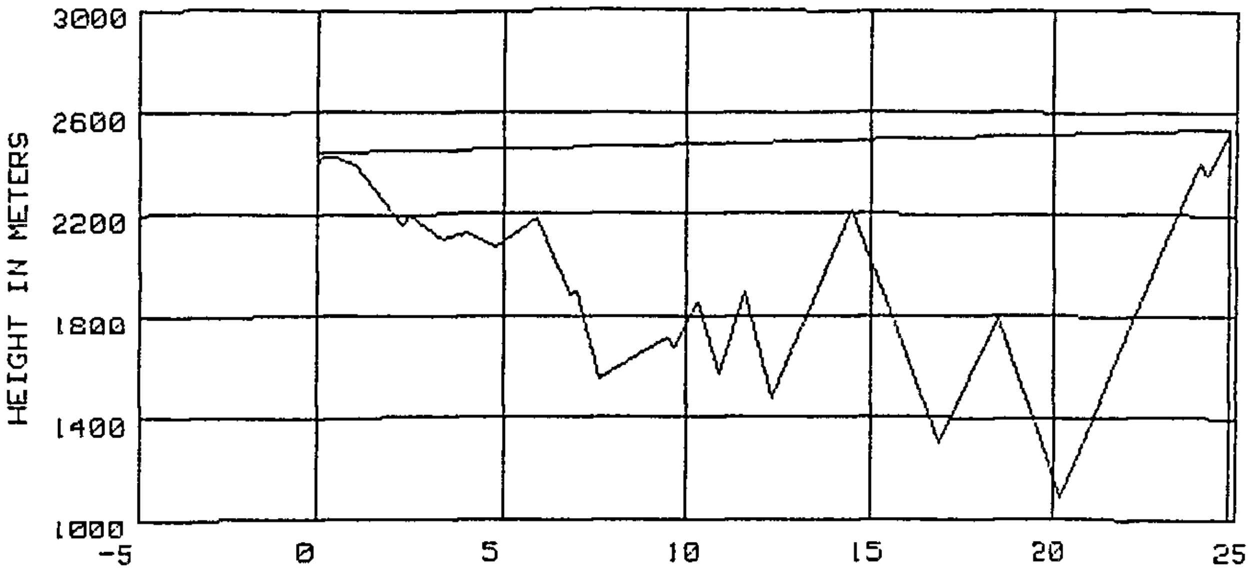
PATH CLEARANCE AND RIDGE LOSS

K = 1.33

F = 900 MHz : (λ = 333 mm)

Hg1 = 2400.0 m	Hg2 = 1750.0 m	
Ha1 = 10.0 m	Ha2 = 10.0 m	
D1 = 2.1 km	D2 = 1.7 km	Hm = 2040.0 m
U = 0.60	Ld = 0.0 dB	
Lfs = 103.1 dB	Lfs + Ld = 103.1 dB	

PATH PROFILE (4/3 RADIUS)

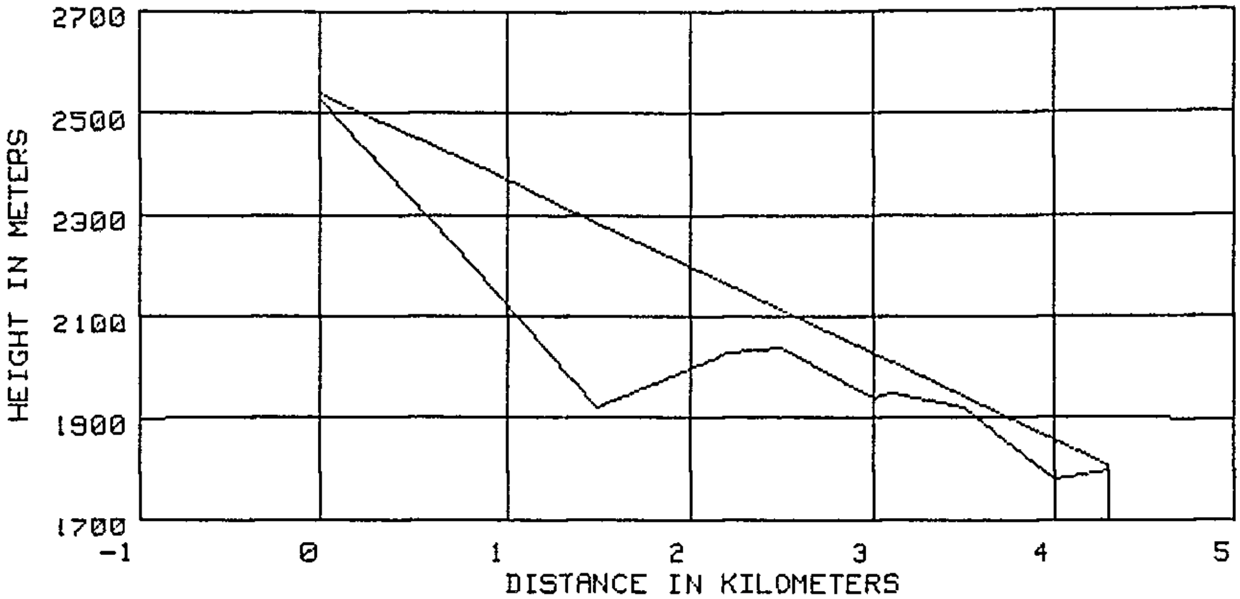


DISTANCE : 24.8 km

SITE 1 : Cerro UCHUMACHI		SITE 2 : Cerro TORINI	
GROUND ELEVATION:	2400.0 m	GROUND ELEVATION:	2530.0 m
ANTENNA HEIGHT:	40.0 m	ANTENNA HEIGHT:	10.0 m

```
##################################################################
#                                                                #
#                 PATH CLEARANCE AND RIDGE LOSS                  #
#                                                                #
#                                                                #
#      K    =    1.33                                            #
#                                                                #
#      F    =   900 MHz :  (λ =  333 mm)                         #
#                                                                #
#      Hg1  = 2400.0  m      Hg2  = 2530.0  m                    #
#      Ha1  =   40.0  m      Ha2  =   10.0  m                    #
#                                                                #
#      D1   =    0.1 km      D2   =   24.7 km   Hm = 2440.0 m    #
#      U    =    0.04        Ld   =    5.5 dB                    #
#                                                                #
#                                                                #
#      Lfs  = 119.4 dB       Lfs + Ld  = 124.9 dB                #
#                                                                #
#                                                                #
##################################################################
```

PATH PROFILE (4/3 RADIUS)

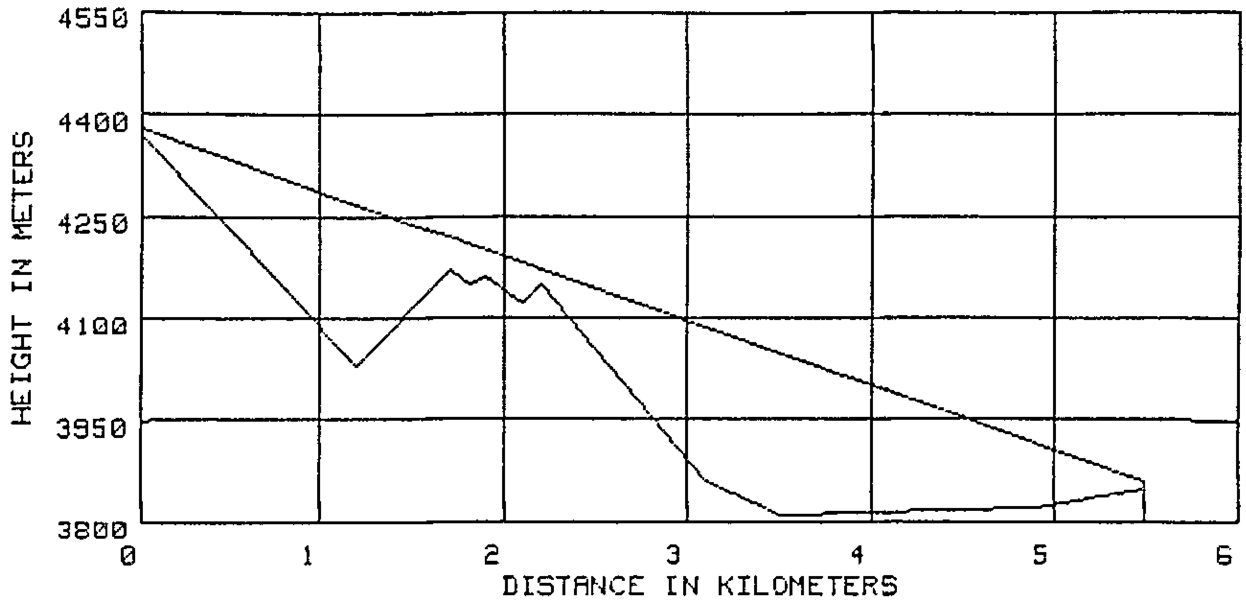


DISTANCE : 4.3 km

SITE 1 : Cerro TORINI	SITE 2 : CHULUMANI
GROUND ELEVATION: 2530.0 m	GROUND ELEVATION: 1800.0 m
ANTENNA HEIGHT: 10.0 m	ANTENNA HEIGHT: 10.0 m

```
##################################################################
#                                                                #
#                  PATH CLEARANCE AND RIDGE LOSS                 #
#                                                                #
#                                                                #
#     K     =    1.33                                            #
#                                                                #
#     F     =   900 MHz :  (λ =  333 mm)                         #
#                                                                #
#     Hg1   = 2530.0  m      Hg2   = 1800.0  m                   #
#     Ha1   =   10.0  m      Ha2   =   10.0  m                   #
#                                                                #
#     D1    =    2.5 km      D2    =    1.8 km   Hm = 2060.0 m   #
#     U     =    2.96        Ld    =    0.0 dB                   #
#                                                                #
#                                                                #
#     Lfs   = 104.2 dB       Lfs + Ld  = 104.2 dB                #
#                                                                #
#                                                                #
##################################################################
```

PATH PROFILE (4/3 RADIUS)

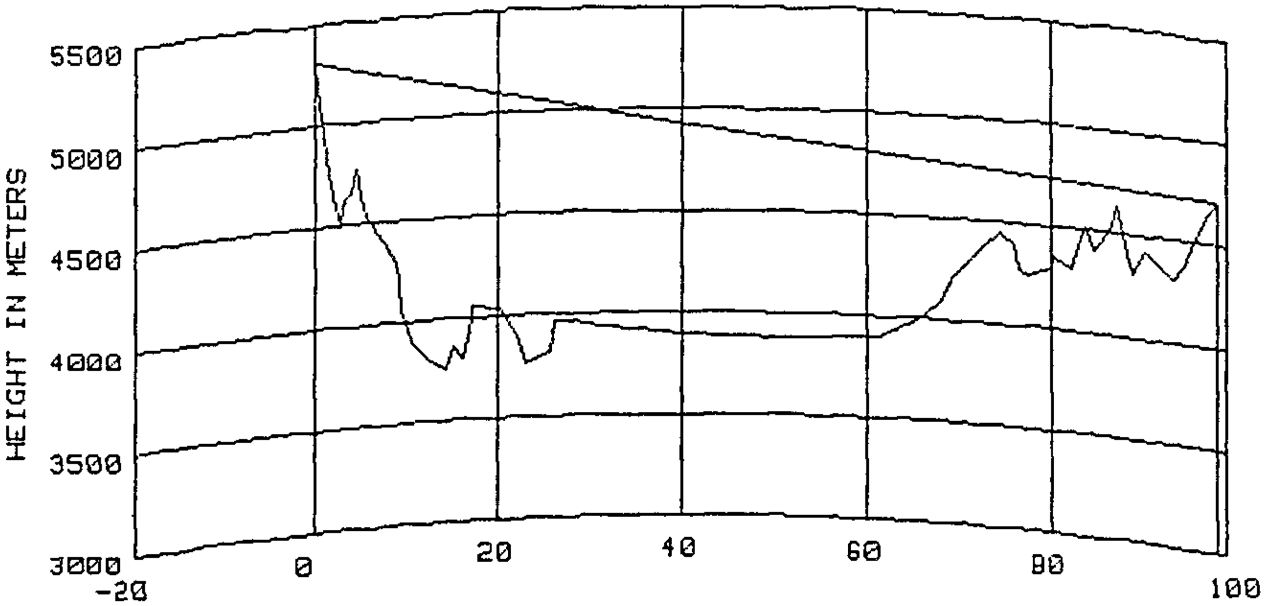


DISTANCE : 5.5 km

SITE 1 : Rep.COPACABANA	SITE 2 : COPACABANA
GROUND ELEVATION: 4370.0 m	GROUND ELEVATION: 3850.0 m
ANTENNA HEIGHT: 10.0 m	ANTENNA HEIGHT: 10.0 m

```
#################################################################
#                                                               #
#                PATH CLEARANCE AND RIDGE LOSS                  #
#                                                               #
#                                                               #
#       K     =    1.33                                         #
#                                                               #
#       F     =   900 MHz :  (λ =   333 mm)                     #
#                                                               #
#       Hg1   = 4370.0  m       Hg2  = 3850.0  m                #
#       Ha1   =   10.0  m       Ha2  =   10.0  m                #
#                                                               #
#       D1    =    2.2 km       D2   =     3.3 km   Hm = 4150.0 m  #
#       U     =    1.03         Ld   =     0.0 dB               #
#                                                               #
#                                                               #
#       Lfs   = 106.3 dB        Lfs + Ld  = 106.3 dB            #
#                                                               #
#                                                               #
#################################################################
```

PATH PROFILE (4/3 RADIUS)



DISTANCE IN KILOMETERS

DISTANCE : 98.7 km

SITE 1 : CHACALTAYA

GROUND ELEVATION: 5300.0 m

ANTENNA HEIGHT: 10.0 m

SITE 2 : Cerro CACHACA

GROUND ELEVATION: 4700.0 m

ANTENNA HEIGHT: 10.0 m

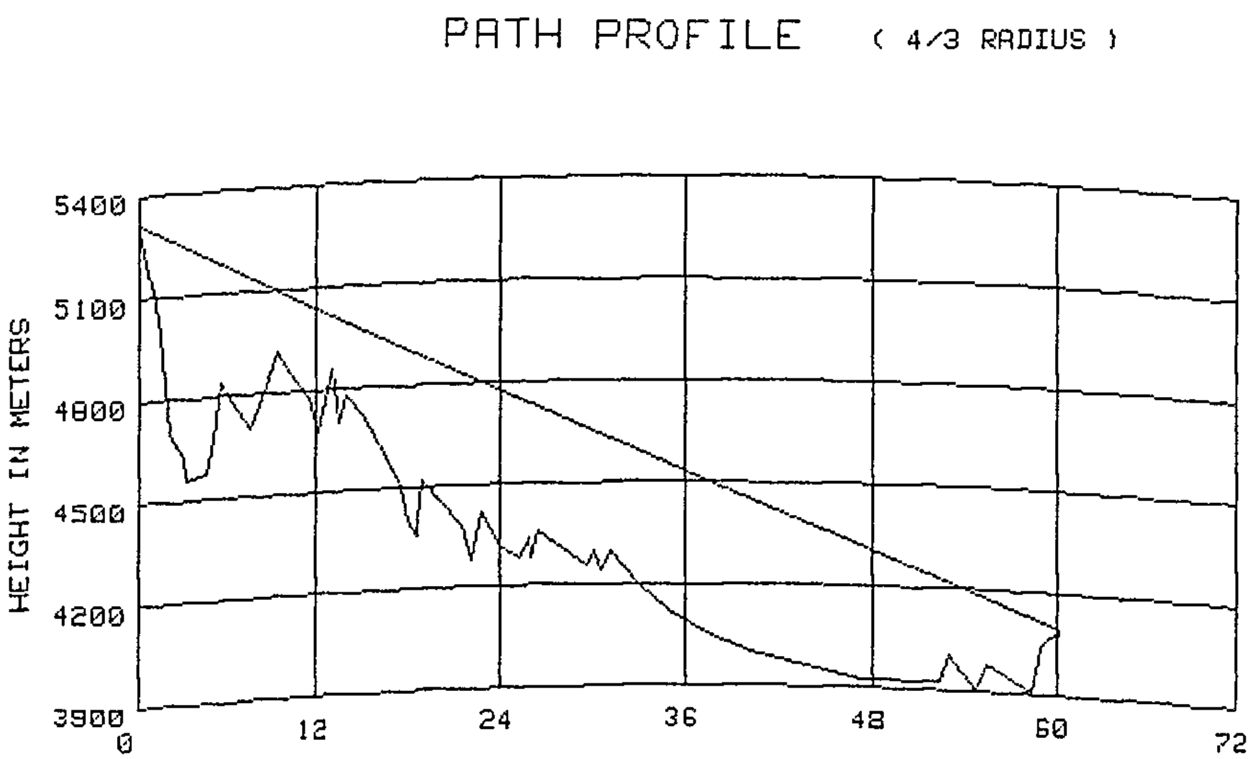
PATH CLEARANCE AND RIDGE LOSS

K = 1.33

F = 160 MHz : (λ = 1875 mm)

Hg1 = 5300.0 m	Hg2 = 4700.0 m		
Ha1 = 10.0 m	Ha2 = 10.0 m		
D1 = 97.5 km	D2 = 1.2 km	Hm = 4620.0 m	
U = 1.92	Ld = 0.0 dB		

Lfs = 116.4 dB   Lfs + Ld = 116.4 dB



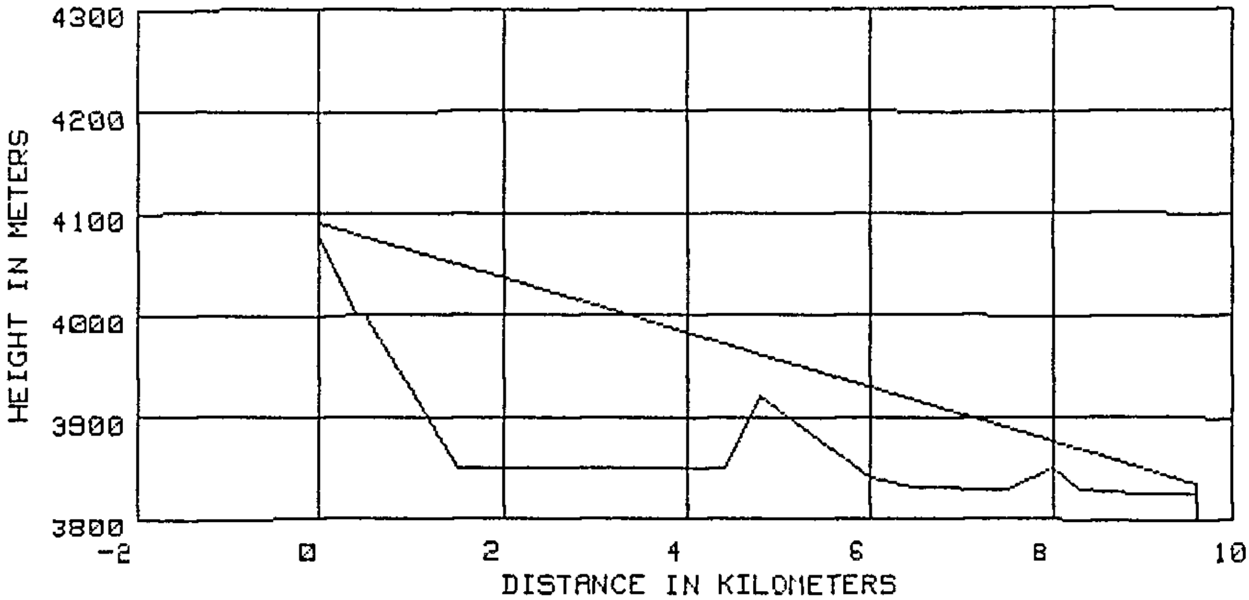
DISTANCE : 60.2 km

SITE 1 : CHACALTAYA
GROUND ELEVATION: 5300.0 m
ANTENNA HEIGHT: 10.0 m

SITE 2 : C.CHAQUE CHUANI
GROUND ELEVATION: 4080.0 m
ANTENNA HEIGHT: 10.0 m

```
##################################################################
#                                                                #
#                PATH CLEARANCE AND RIDGE LOSS                   #
#                                                                #
#                                                                #
#      K     =     1.33                                          #
#                                                                #
#      F     =    160 MHz :  (λ = 1875 mm)                       #
#                                                                #
#      Hg1   = 5300.0  m       Hg2  = 4080.0  m                  #
#      Ha1   =    10.0  m      Ha2  =    10.0  m                 #
#                                                                #
#      D1    =    59.6 km      D2   =     0.6 km   Hm = 4070.0 m #
#      U     =     0.90        Ld   =     0.0 dB                 #
#                                                                #
#                                                                #
#      Lfs   = 112.1 dB        Lfs + Ld  = 112.1 dB              #
#                                                                #
#                                                                #
##################################################################
```

PATH PROFILE (4/3 RADIUS)

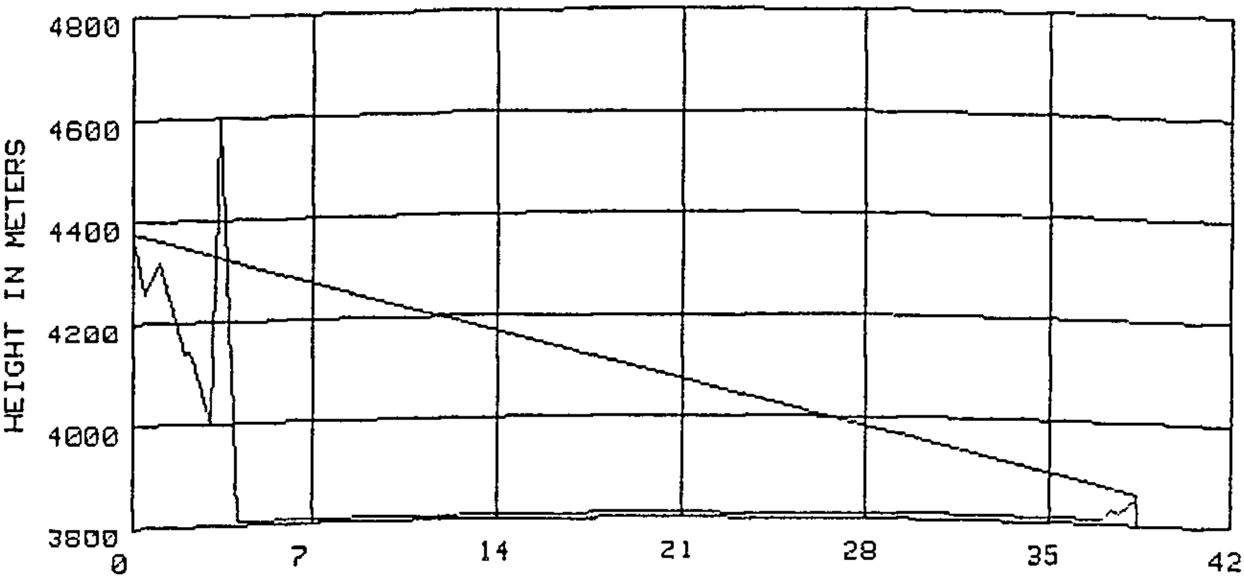


DISTANCE : 9.6 km

SITE 1 : C.CHAQUE CHUANI	SITE 2 : ACHACACHI
GROUND ELEVATION: 4080.0 m	GROUND ELEVATION: 3825.0 m
ANTENNA HEIGHT: 10.0 m	ANTENNA HEIGHT: 10.0 m

```
#################################################################
#                                                               #
#                 PATH CLEARANCE AND RIDGE LOSS                 #
#                                                               #
#                                                               #
#       K     =    1.33                                         #
#                                                               #
#       F     =   160 MHz :  (λ = 1875 mm)                      #
#                                                               #
#       Hg1   = 4080.0  m       Hg2  = 3825.0  m                #
#       Ha1   =   10.0  m       Ha2  =   10.0  m                #
#                                                               #
#       D1    =    4.8 km       D2   =    4.8 km   Hm = 3930.0 m #
#       U     =    0.46         Ld   =    0.0 dB                #
#                                                               #
#                                                               #
#       Lfs   =  96.2 dB        Lfs + Ld  =  96.2 dB            #
#                                                               #
#                                                               #
#################################################################
```

PATH PROFILE (4/3 RADIUS)

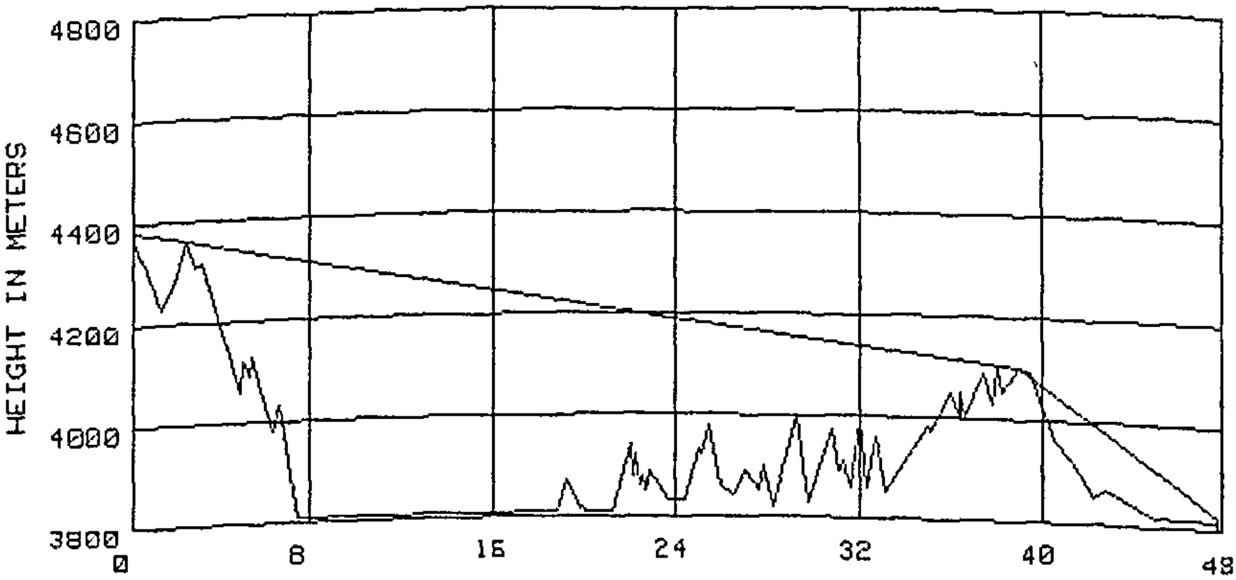


DISTANCE : 38.5 km

SITE 1 : Cerro COPACABANA		SITE 2 : MINA MATILDE	
GROUND ELEVATION:	4370.0 m	GROUND ELEVATION:	3850.0 m
ANTENNA HEIGHT:	10.0 m	ANTENNA HEIGHT:	10.0 m

```
#####################################################################
#                                                                   #
#                   PATH CLEARANCE AND RIDGE LOSS                   #
#                                                                   #
#                                                                   #
#      K     =     1.33                                             #
#                                                                   #
#      F     =   160 MHz :  (λ = 1875 mm)                           #
#                                                                   #
#      Hg1   = 4370.0   m       Hg2   = 3850.0   m                  #
#      Ha1   =   10.0   m       Ha2   =   10.0   m                  #
#                                                                   #
#      D1    =    3.4 km        D2    =   35.1 km    Hm = 4600.0 m  #
#      U     =   -3.58          Ld    =   27.1 dB                   #
#                                                                   #
#                                                                   #
#      Lfs   = 108.2 dB         Lfs + Ld  = 135.3 dB                #
#                                                                   #
#                                                                   #
#####################################################################
```

PATH PROFILE (4/3 RADIUS)



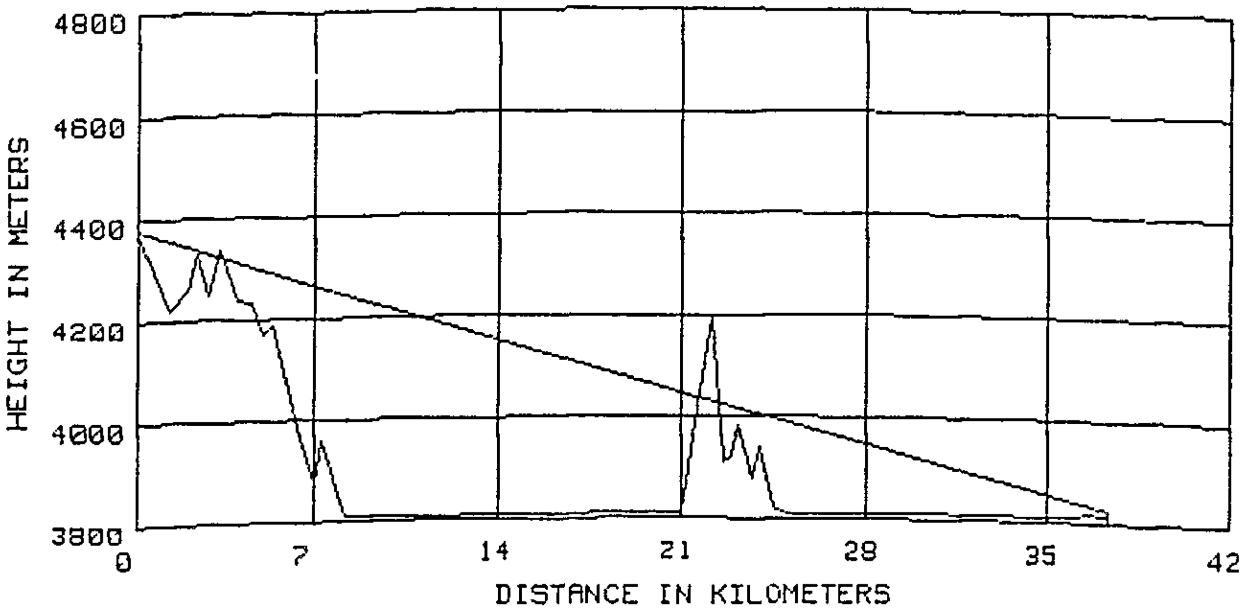
DISTANCE D : 47.8 km

SITE 1 : Rep COPACABANA — GROUND ELEVATION:4370.0 m — ANTENNA HEIGHT: 10.0 m

SITE 2 : HUARINA — GROUND ELEVATION:3815.0 m — ANTENNA HEIGHT: 10.0 m

```
#####################################################################
#                                                                   #
#                 PATH CLEARANCE AND RIDGE LOSS                     #
#                                                                   #
#       K    =    1.33                                              #
#       F    =  160  MHz :  (λ = 1875 mm)                           #
#       Hg1  = 4370.0  m       Hg2  = 3815.0  m                     #
#       Ha1  =   10  m         Ha2  =   10    m                     #
#                                                                   #
#    1: D1   =   2.4 km        D2   =  45.4 km   Hm = 4360.0 m      #
#       U    =   -.04          Ld   =   6.5 dB                      #
#    2: D1   =  39.0 km        D2   =   8.8 km   Hm = 4100.0 m      #
#       U    =  -1.66          Ld   =  20.4 dB                      #
#                                                                   #
#       Lfs  = 110.1  dB       Lfs + Ld  = 137.0  dB                #
#                                                                   #
#                                                                   #
#####################################################################
```

PATH PROFILE (4/3 RADIUS)



DISTANCE : 37.4 km

SITE 1 : Rep.COPACABANA	SITE 2 : HUATAJATA
GROUND ELEVATION: 4370.0 m	GROUND ELEVATION: 3815.0 m
ANTENNA HEIGHT: 10.0 m	ANTENNA HEIGHT: 10.0 m

PATH CLEARANCE AND RIDGE LOSS

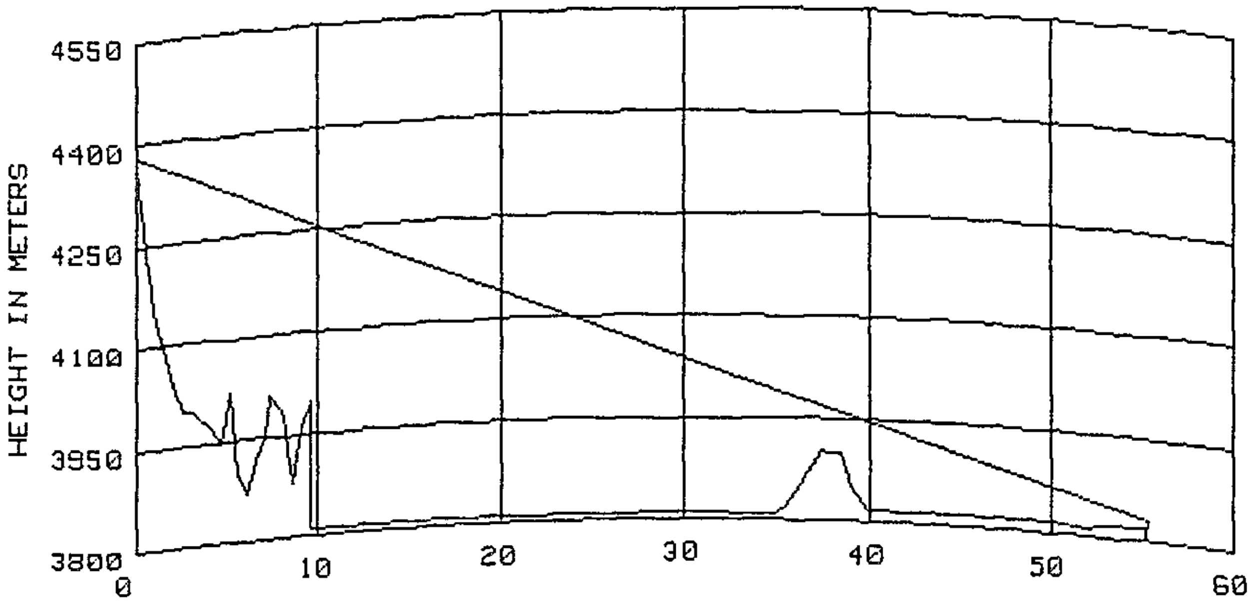
K = 1.33

F = 160 MHz : (λ = 1875 mm)

Hg1 = 4370.0 m	Hg2 = 3815.0 m	
Ha1 = 10.0 m	Ha2 = 10.0 m	
D1 = 22.2 km	D2 = 15.2 km	Hm = 4200.0 m
U = -1.30	Ld = 18.4 dB	

Lfs = 108.0 dB   Lfs + Ld = 126.4 dB

PATH PROFILE (4/3 RADIUS)

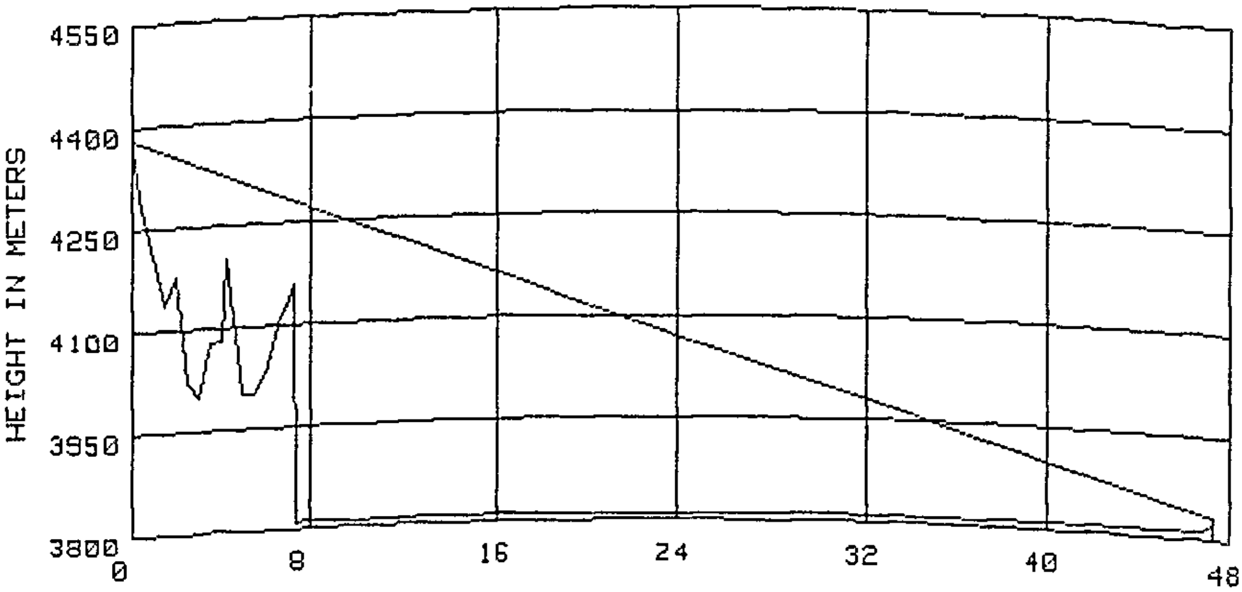


DISTANCE : 55.3 km

SITE 1 : Rep.COPACABANA		SITE 2 : GUAQUI	
GROUND ELEVATION:	4370.0 m	GROUND ELEVATION:	3820.0 m
ANTENNA HEIGHT:	10.0 m	ANTENNA HEIGHT:	10.0 m

```
######################################################################
#                                                                    #
#               PATH CLEARANCE AND RIDGE LOSS                        #
#                                                                    #
#                                                                    #
#      K    =    1.33                                                #
#                                                                    #
#      F    =   160 MHz :  (λ = 1875 mm)                             #
#                                                                    #
#      Hg1  = 4370.0  m        Hg2  = 3820.0  m                      #
#      Ha1  =   10.0  m        Ha2  =   10.0  m                      #
#                                                                    #
#      D1   =   52.7 km        D2   =     2.6 km   Hm = 3825.0 m     #
#      U    =    0.33          Ld   =     2.1 dB                     #
#                                                                    #
#                                                                    #
#      Lfs  = 111.4 dB         Lfs + Ld  = 113.5 dB                  #
#                                                                    #
#                                                                    #
######################################################################
```

PATH PROFILE (4/3 RADIUS)

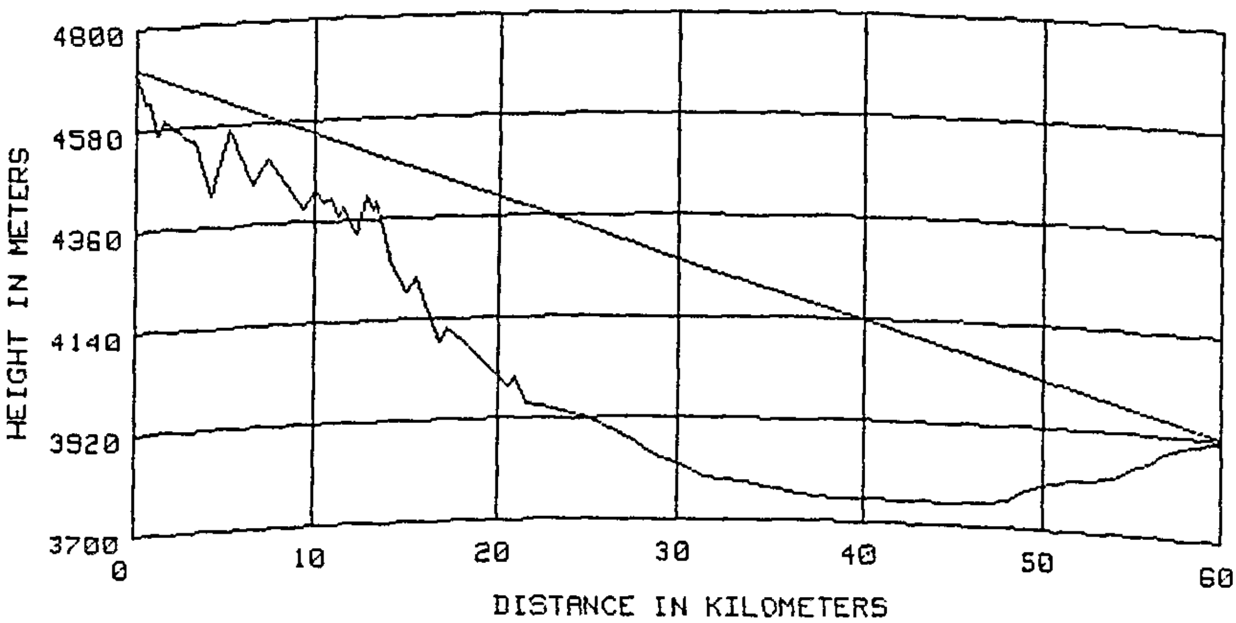


DISTANCE : 47.3 km

SITE 1 : Rep.COPACABANA		SITE 2 : DESAGUADERO	
GROUND ELEVATION:	4370.0 m	GROUND ELEVATION:	3820.0 m
ANTENNA HEIGHT:	10.0 m	ANTENNA HEIGHT:	10.0 m

```
######################################################################
#                                                                    #
#                  PATH CLEARANCE AND RIDGE LOSS                     #
#                                                                    #
#                                                                    #
#       K     =    1.33                                              #
#                                                                    #
#       F     =   160 MHz :  (λ = 1875 mm)                           #
#                                                                    #
#       Hg1   = 4370.0  m      Hg2  = 3820.0  m                      #
#       Ha1   =   10.0  m      Ha2  =   10.0  m                      #
#                                                                    #
#       D1    =   46.8 km      D2   =    0.5 km   Hm = 3820.0 m      #
#       U     =    0.47        Ld   =    0.0 dB                      #
#                                                                    #
#                                                                    #
#       Lfs   = 110.0 dB       Lfs + Ld  = 110.0 dB                  #
#                                                                    #
#                                                                    #
######################################################################
```

PATH PROFILE (4/3 RADIUS)



DISTANCE : 59.9 km

SITE 1 : Cerro CACHACA		SITE 2 : SICA SICA	
GROUND ELEVATION:	4700.0 m	GROUND ELEVATION:	3910.0 m
ANTENNA HEIGHT:	10.0 m	ANTENNA HEIGHT:	10.0 m

PATH CLEARANCE AND RIDGE LOSS

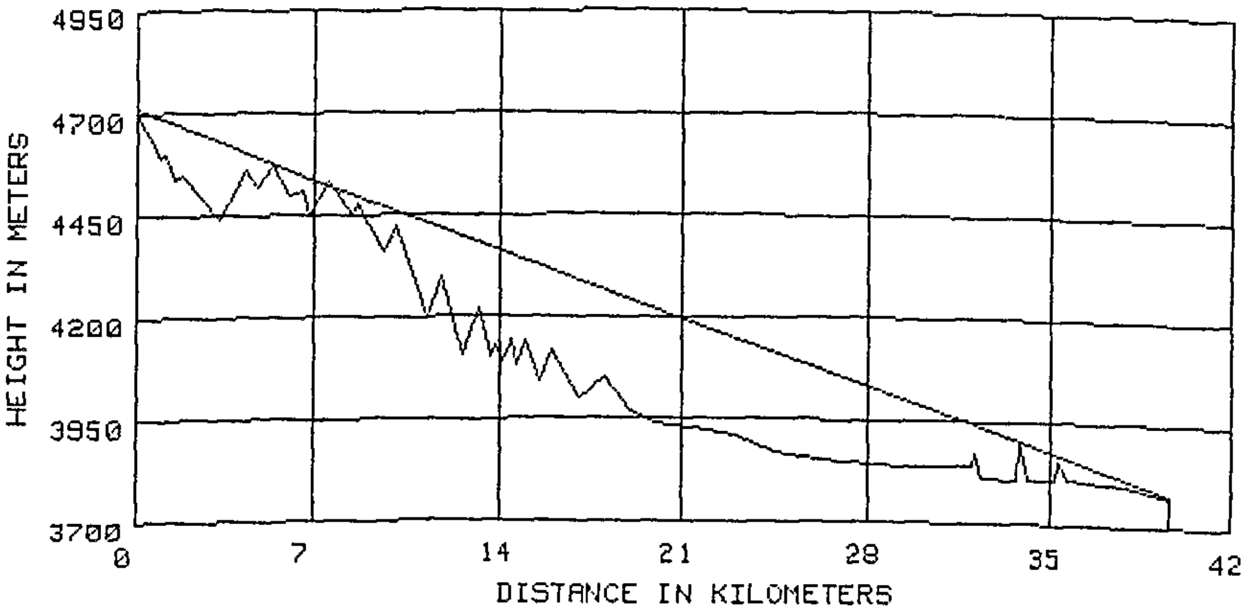
K = 1.33

F = 160 MHz : (λ = 1875 mm)

Hg1 = 4700.0 m		Hg2 = 3910.0 m		
Ha1 = 10.0 m		Ha2 = 10.0 m		
D1 = 58.4 km		D2 = 1.5 km		Hm = 3910.0 m
U = 0.47		Ld = 0.0 dB		

Lfs = 112.1 dB Lfs + Ld = 112.1 dB

PATH PROFILE (4/3 RADIUS)

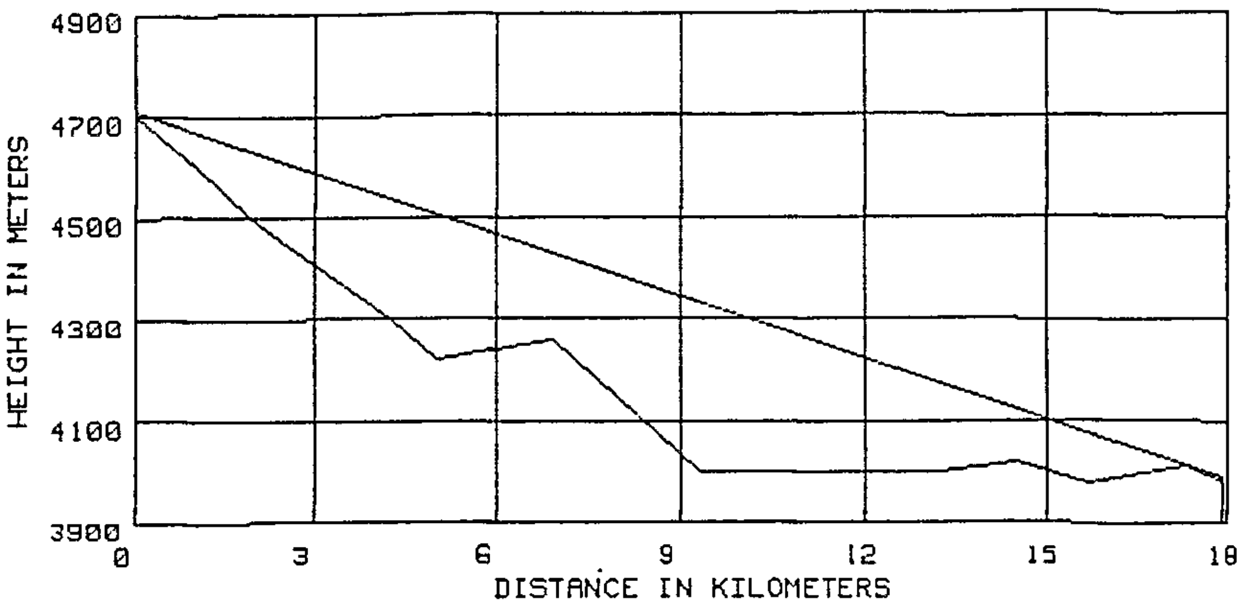


DISTANCE : 39.6 km

SITE 1 : Cerro CACHACA	SITE 2 : PATACAMAYA
GROUND ELEVATION: 4700.0 m	GROUND ELEVATION: 3770.0 m
ANTENNA HEIGHT: 10.0 m	ANTENNA HEIGHT: 10.0 m

```
PATH CLEARANCE AND RIDGE LOSS

K    =   1.33

F    =   160 MHz :  (λ = 1875 mm)

Hg1  = 4700.0  m      Hg2  = 3770.0  m
Ha1  =   10.0  m      Ha2  =   10.0  m

D1   =    7.5 km      D2   =   32.1 km    Hm = 4530.0 m
U    =   -.10         Ld   =    7.2 dB

Lfs  = 108.5 dB       Lfs + Ld  = 115.7 dB
```

PATH PROFILE (4/3 RADIUS)

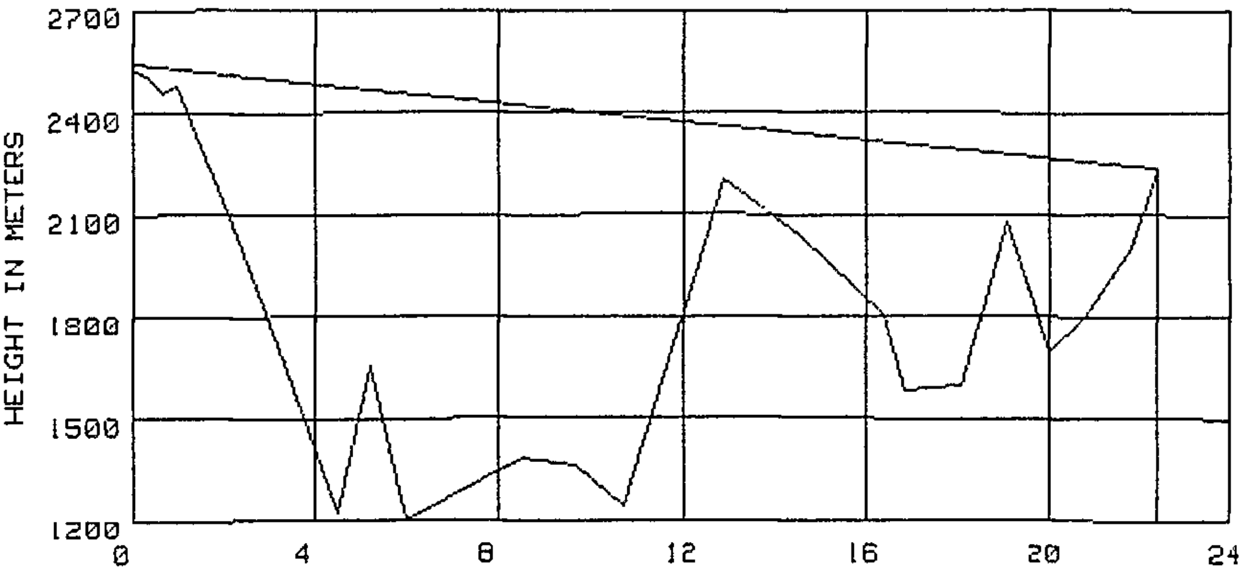


DISTANCE : 17.9 km

SITE 1 : Cerro CACHACA	SITE 2 : COROCORO
GROUND ELEVATION: 4700.0 m	GROUND ELEVATION: 3980.0 m
ANTENNA HEIGHT: 10.0 m	ANTENNA HEIGHT: 10.0 m

```
######################################################################
#                                                                    #
#                 PATH CLEARANCE AND RIDGE LOSS                      #
#                                                                    #
#                                                                    #
#       K     =     1.33                                             #
#                                                                    #
#       F     =   160 MHz :  (λ = 1875 mm)                           #
#                                                                    #
#       Hg1   = 4700.0  m       Hg2  = 3980.0  m                     #
#       Ha1   =   10.0  m       Ha2  =   10.0  m                     #
#                                                                    #
#       D1    =   17.3 km       D2   =     0.6 km   Hm = 4010.0 m    #
#       U     =    0.11         Ld   =     4.7 dB                    #
#                                                                    #
#                                                                    #
#       Lfs   = 101.6 dB        Lfs + Ld   = 106.3 dB                #
#                                                                    #
#                                                                    #
######################################################################
```

PATH PROFILE (4/3 RADIUS)

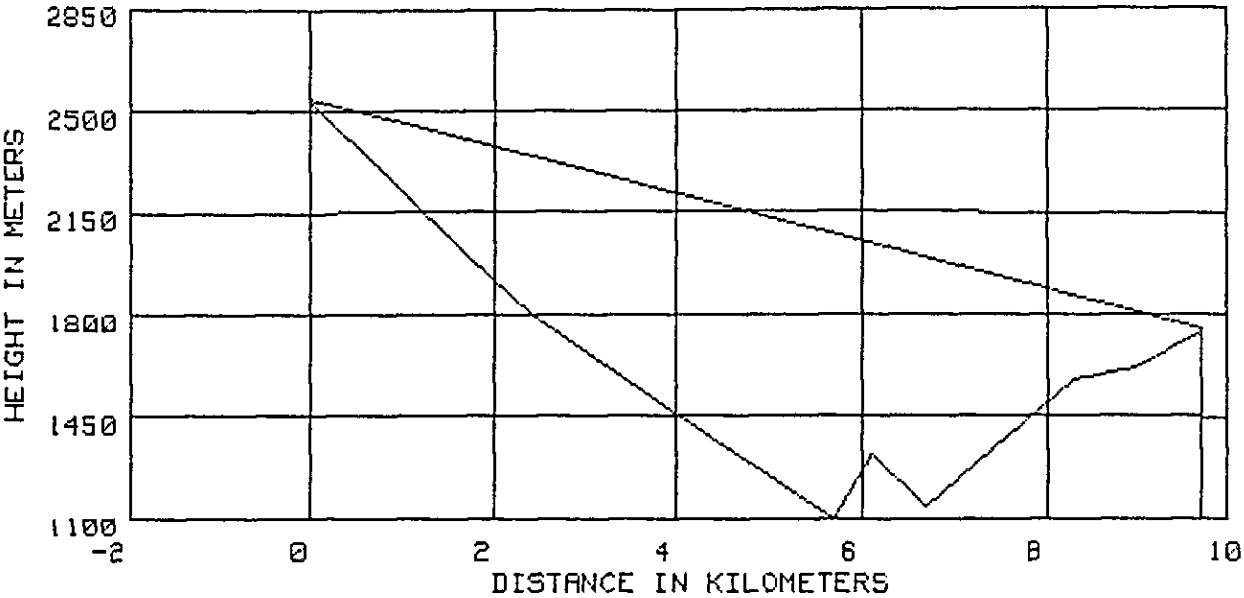


DISTANCE : 22.4 km

SITE 1 : Cerro TORINI	SITE 2 : CHOJLLA
GROUND ELEVATION: 2530.0 m	GROUND ELEVATION: 2230.0 m
ANTENNA HEIGHT: 10.0 m	ANTENNA HEIGHT: 10.0 m

```
########################################################################
#                                                                      #
#                  PATH CLEARANCE AND RIDGE LOSS                       #
#                                                                      #
#                                                                      #
#       K     =    1.33                                                #
#                                                                      #
#       F     =   160 MHz :  (λ = 1875 mm)                             #
#                                                                      #
#       Hg1   = 2530.0  m       Hg2  = 2230.0  m                       #
#       Ha1   =   10.0  m       Ha2  =   10.0  m                       #
#                                                                      #
#       D1    =   12.9 km       D2   =    9.5 km   Hm = 2220.0 m       #
#       U     =    1.38         Ld   =    0.0 dB                       #
#                                                                      #
#                                                                      #
#       Lfs   = 103.5 dB        Lfs + Ld  = 103.5 dB                   #
#                                                                      #
#                                                                      #
########################################################################
```

PATH PROFILE (4/3 RADIUS)

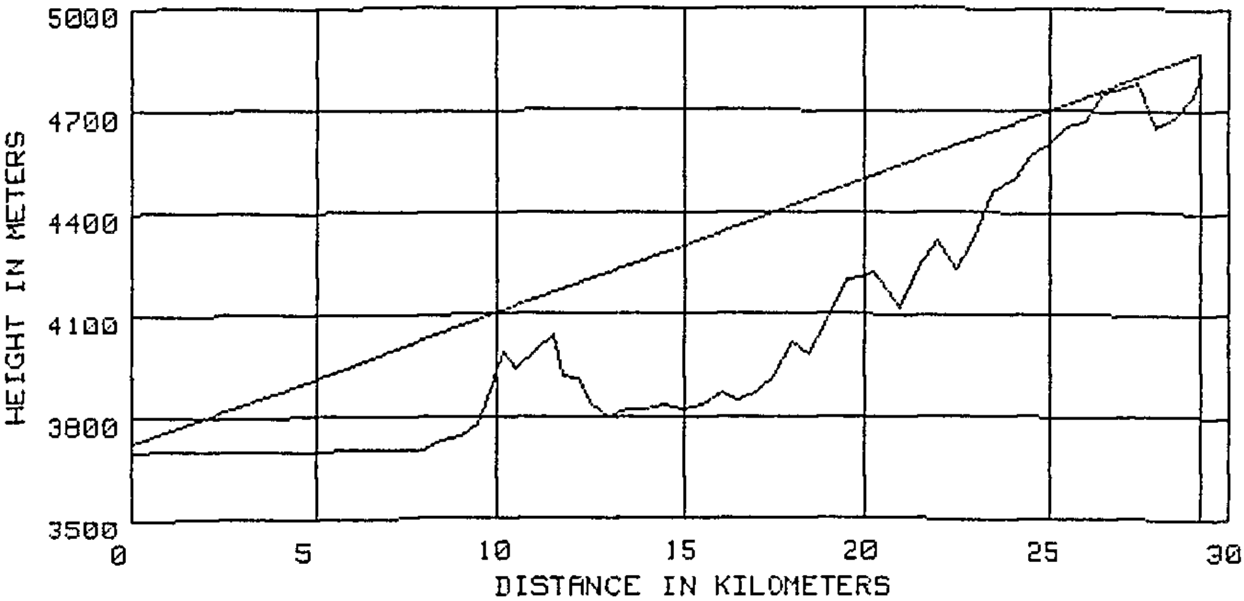


DISTANCE : 9.7 km

SITE 1 : Cerro TORINI		SITE 2 : CORIPATA	
GROUND ELEVATION:	2530.0 m	GROUND ELEVATION:	1740.0 m
ANTENNA HEIGHT:	10.0 m	ANTENNA HEIGHT:	10.0 m

```
#####################################################################
#                                                                   #
#                 PATH CLEARANCE AND RIDGE LOSS                     #
#                                                                   #
#                                                                   #
#       K     =     1.33                                            #
#                                                                   #
#       F     =    160 MHz :  (λ = 1875 mm)                         #
#                                                                   #
#       Hg1   = 2530.0  m       Hg2  = 1740.0  m                    #
#       Ha1   =   10.0  m       Ha2  =   10.0  m                    #
#                                                                   #
#       D1    =     9.0 km      D2   =     0.7 km   Hm = 1640.0 m   #
#       U     =     4.78        Ld   =     0.0 dB                   #
#                                                                   #
#                                                                   #
#       Lfs   =  96.3 dB        Lfs + Ld   =   96.3 dB              #
#                                                                   #
#                                                                   #
#####################################################################
```

PATH PROFILE (4/3 RADIUS)

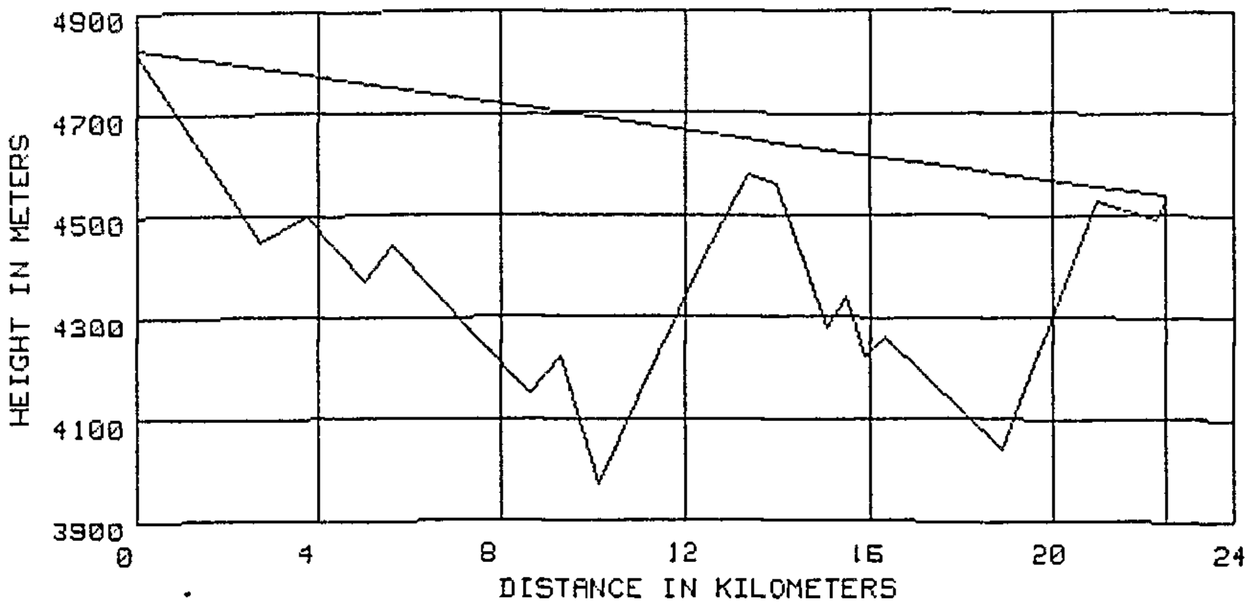


DISTANCE : 29.2 km

SITE 1 : ORURO	SITE 2 : NEGRO PABELLON
GROUND ELEVATION: 3700.0 m	GROUND ELEVATION: 4816.0 m
ANTENNA HEIGHT: 25.0 m	ANTENNA HEIGHT: 55.0 m

```
##################################################################
#                                                                #
#                 PATH CLEARANCE AND RIDGE LOSS                  #
#                                                                #
#                                                                #
#       K     =     1.33                                         #
#                                                                #
#       F     =  7275 MHz :  (λ =    41 mm)                      #
#                                                                #
#       Hg1   = 3700.0  m      Hg2  = 4816.0  m                  #
#       Ha1   =   25.0  m      Ha2  =   55.0  m                  #
#                                                                #
#       D1    =   26.5 km      D2   =     2.7 km   Hm = 4750.0 m #
#       U     =    1.08        Ld   =     0.0 dB                 #
#                                                                #
#                                                                #
#       Lfs   = 139.0 dB       Lfs + Ld  = 139.0 dB              #
#                                                                #
#                                                                #
##################################################################
```

PATH PROFILE (4/3 RADIUS)



DISTANCE : 22.5 km

SITE 1 : NEGRO PABELLON		SITE 2 : Cerro CALICHE	
GROUND ELEVATION:	4820.0 m	GROUND ELEVATION:	4530.0 m
ANTENNA HEIGHT:	10.0 m	ANTENNA HEIGHT:	10.0 m

PATH CLEARANCE AND RIDGE LOSS

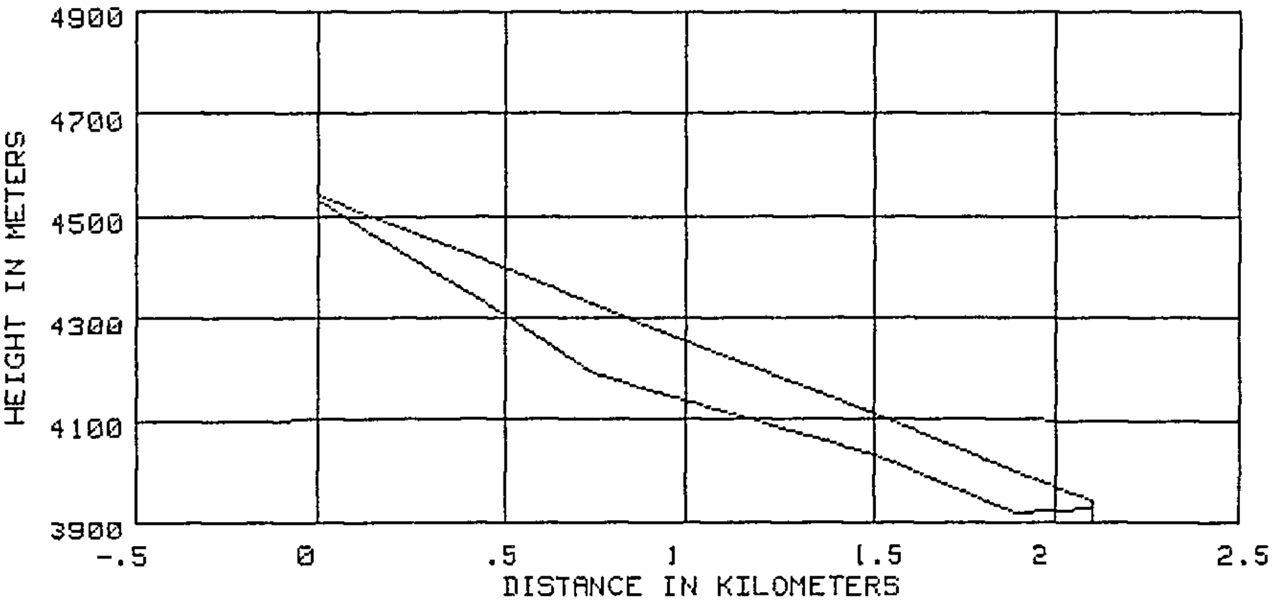
K = 1.33

F = 7275 MHz : (λ = 41 mm)

Hg1	= 4820.0 m	Hg2	= 4530.0 m		
Ha1	= 10.0 m	Ha2	= 10.0 m		
D1	= 21.0 km	D2	= 1.5 km	Hm	= 4528.0 m
U	= 3.88	Ld	= 0.0 dB		

Lfs = 136.7 dB   Lfs + Ld = 136.7 dB

PATH PROFILE (4/3 RADIUS)



DISTANCE : 2.1 km

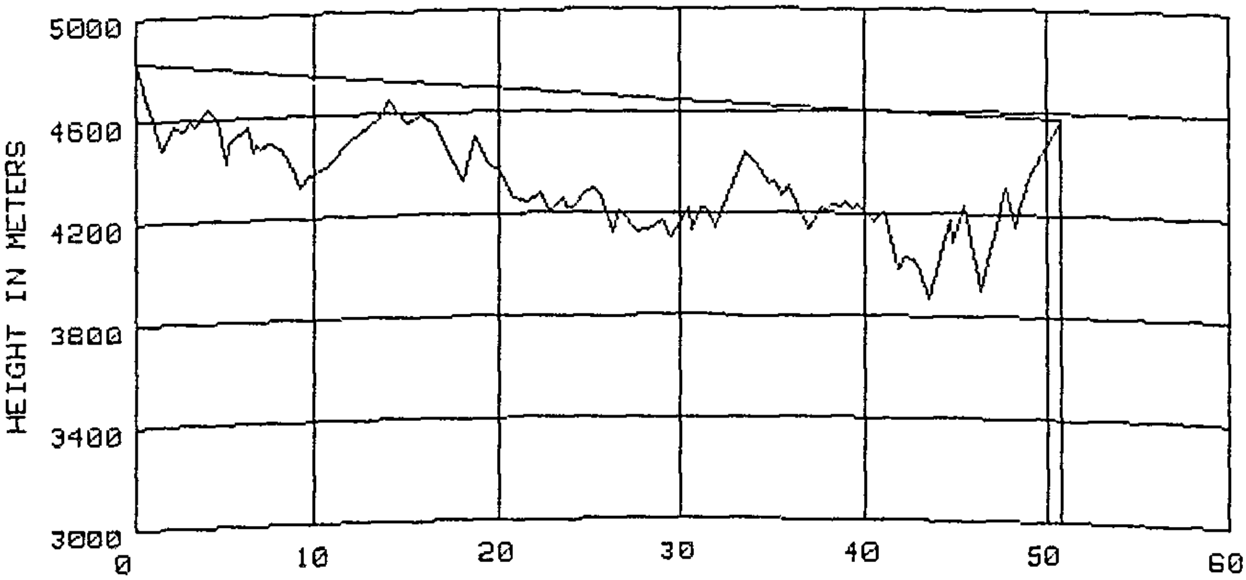
SITE 1 : Cerro CALICHE — SITE 2 : HUANUNI

GROUND ELEVATION: 4530.0 m — GROUND ELEVATION: 3930.0 m

ANTENNA HEIGHT: 10.0 m — ANTENNA HEIGHT: 10.0 m

```
######################################################################
#                                                                    #
#                  PATH CLEARANCE AND RIDGE LOSS                     #
#                                                                    #
#                                                                    #
#       K     =    1.33                                              #
#                                                                    #
#       F     =  7275 MHz :  (λ =    41 mm)                          #
#                                                                    #
#       Hg1   = 4530.0  m      Hg2   = 3930.0  m                     #
#       Ha1   =   10.0  m      Ha2   =   10.0  m                     #
#                                                                    #
#       D1    =    1.9 km      D2    =    0.2 km   Hm = 3930.0 m     #
#       U     =   24.57        Ld    =    0.0 dB                     #
#                                                                    #
#                                                                    #
#       Lfs   = 116.1 dB       Lfs + Ld  = 116.1 dB                  #
#                                                                    #
#                                                                    #
######################################################################
```

PATH PROFILE (4/3 RADIUS)

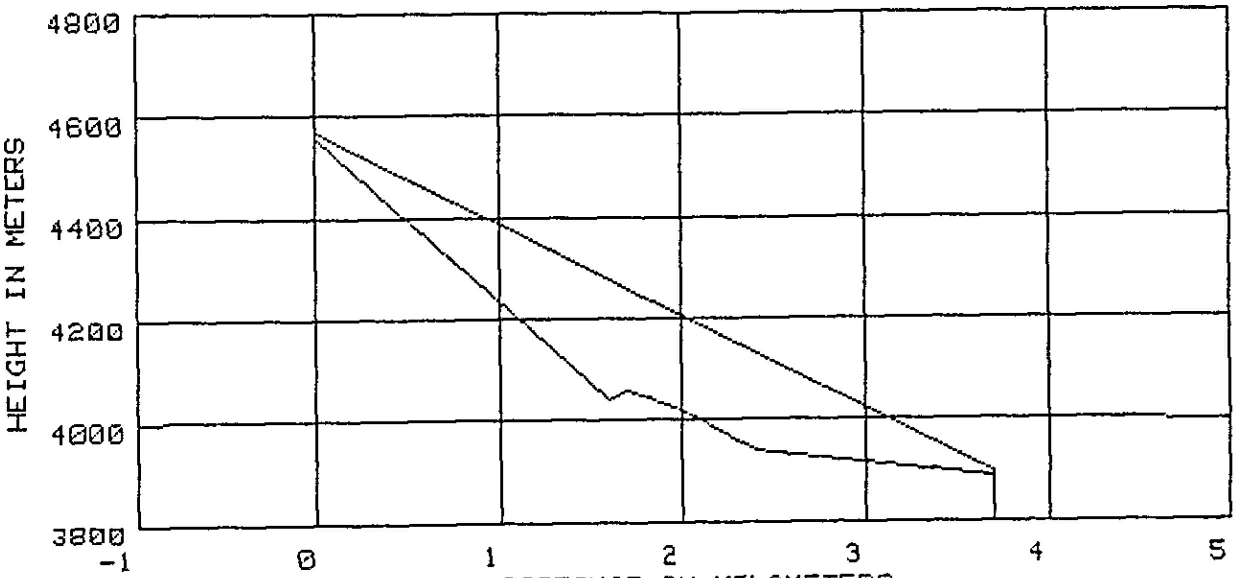


DISTANCE : 50.8 km

SITE 1 : NEGRO PABELLON	SITE 2 : Rep.LLALLAGUA
GROUND ELEVATION: 4816.0 m	GROUND ELEVATION: 4560.0 m
ANTENNA HEIGHT: 10.0 m	ANTENNA HEIGHT: 10.0 m

```
#################################################################
#                                                               #
#                PATH CLEARANCE AND RIDGE LOSS                  #
#                                                               #
#                                                               #
#      K     =    1.33                                          #
#                                                               #
#      F     =  7275 MHz :  (λ =   41 mm)                       #
#                                                               #
#      Hg1   = 4816.0  m      Hg2  = 4560.0  m                  #
#      Ha1   =   10.0  m      Ha2  =   10.0  m                  #
#                                                               #
#      D1    =   14.0 km      D2   =   36.8 km   Hm = 4650.0 m  #
#      U     =    3.67        Ld   =    0.0 dB                  #
#                                                               #
#                                                               #
#      Lfs   = 143.8 dB       Lfs + Ld  = 143.8 dB              #
#                                                               #
#                                                               #
#################################################################
```

PATH PROFILE (4/3 RADIUS)



DISTANCE : 3.7 km

SITE 1 : Rep.LLALLAGUA		SITE 2 : LLALLAGUA	
GROUND ELEVATION:	4560.0 m	GROUND ELEVATION:	3890.0 m
ANTENNA HEIGHT:	10.0 m	ANTENNA HEIGHT:	10.0 m

PATH CLEARANCE AND RIDGE LOSS

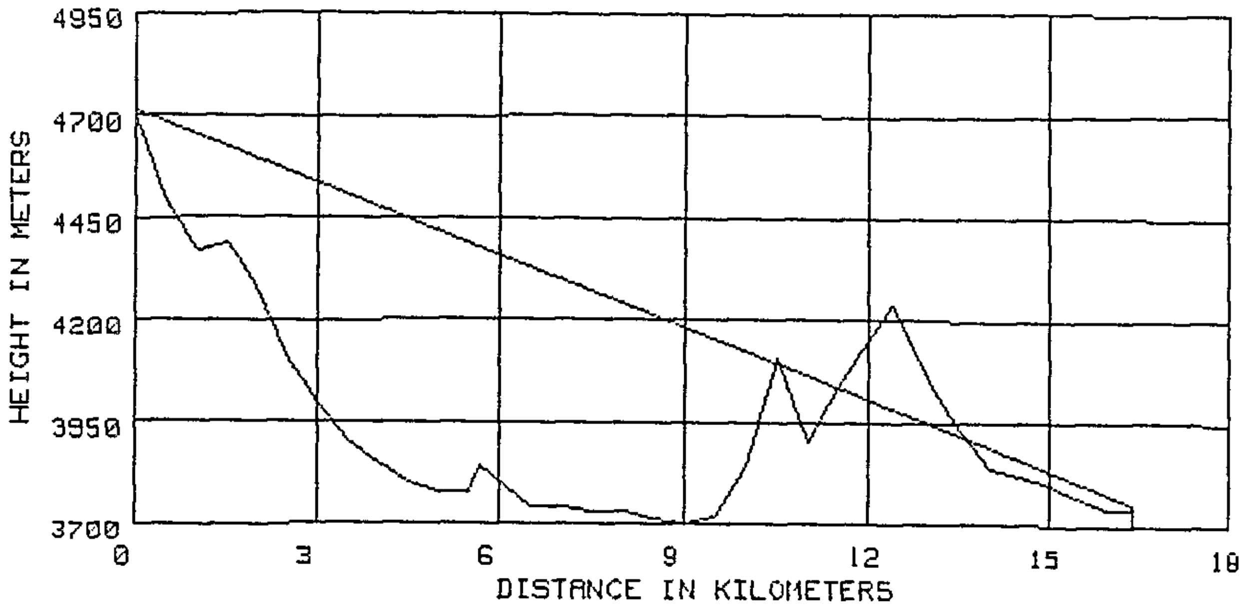
K = 1.33

F = 7275 MHz : (λ = 41 mm)

Hg1	= 4560.0 m	Hg2	= 3890.0 m		
Ha1	= 10.0 m	Ha2	= 10.0 m		
D1	= 3.5 km	D2	= 0.2 km	Hm = 3910.0 m	
U	= 9.37	Ld	= 0.0 dB		

Lfs = 121.1 dB Lfs + Ld = 121.1 dB

PATH PROFILE (4/3 RADIUS)

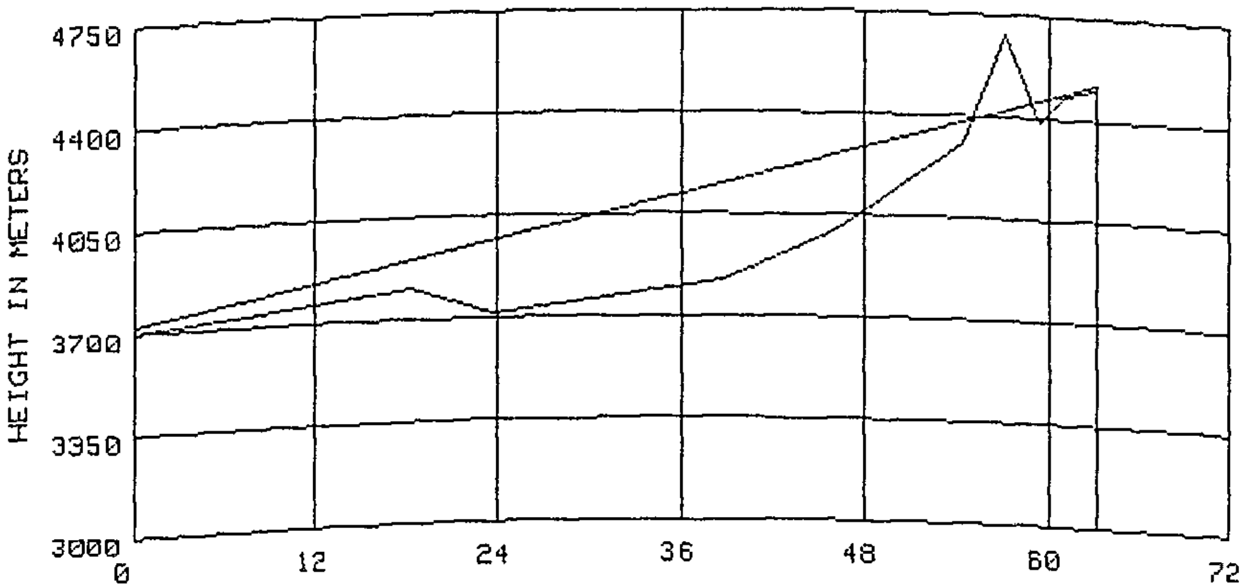


DISTANCE : 16.4 km

SITE 1 : Rep.LLALLAGUA		SITE 2 : CHAYANTA	
GROUND ELEVATION:	4700.0 m	GROUND ELEVATION:	3740.0 m
ANTENNA HEIGHT:	10.0 m	ANTENNA HEIGHT:	10.0 m

```
######################################################################
#                                                                    #
#                  PATH CLEARANCE AND RIDGE LOSS                     #
#                                                                    #
#                                                                    #
#       K     =     1.33                                             #
#                                                                    #
#       F     =    160 MHz :  (λ = 1875 mm)                          #
#                                                                    #
#       Hg1   = 4700.0  m       Hg2  = 3740.0  m                     #
#       Ha1   =   10.0  m       Ha2  =   10.0  m                     #
#                                                                    #
#       D1    =   12.4 km       D2   =     4.0 km   Hm = 4240.0 m    #
#       U     =   -3.44         Ld   =   26.7 dB                     #
#                                                                    #
#                                                                    #
#       Lfs   = 100.8 dB        Lfs + Ld  = 127.6 dB                 #
#                                                                    #
#                                                                    #
######################################################################
```

PATH PROFILE (4/3 RADIUS)

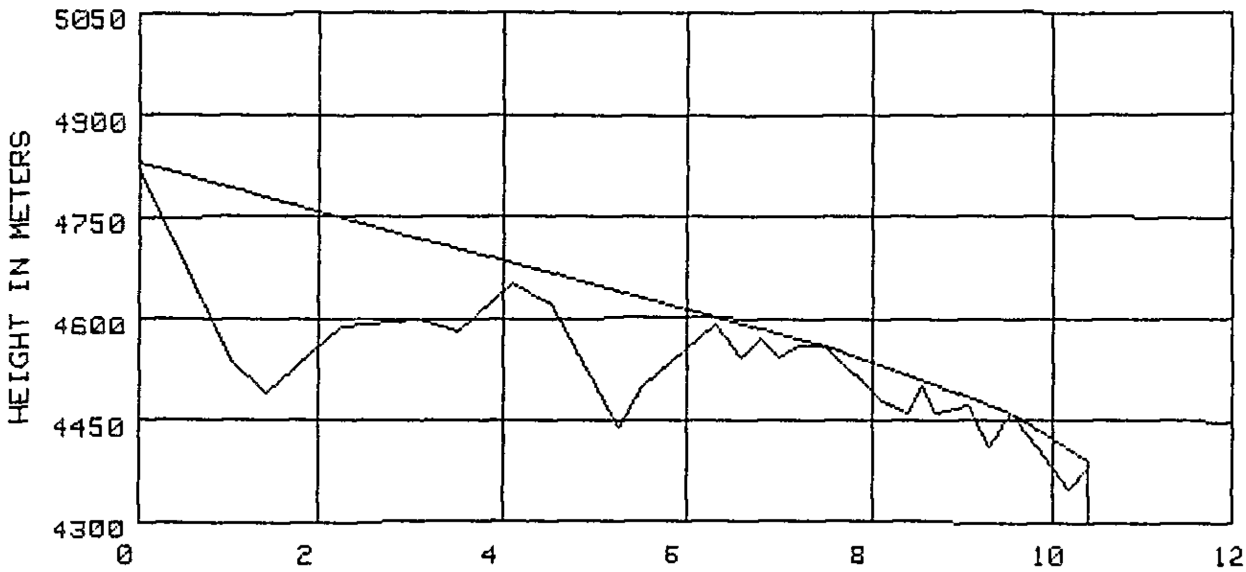


DISTANCE : 63.1 km

SITE 1 : ORURO		SITE 2 : VETA BLANCO	
GROUND ELEVATION:	3700.0 m	GROUND ELEVATION:	4503.0 m
ANTENNA HEIGHT:	25.0 m	ANTENNA HEIGHT:	10.0 m

```
##################################################################
#                                                                #
#                 PATH CLEARANCE AND RIDGE LOSS                  #
#                                                                #
#                                                                #
#       K    =    1.33                                           #
#                                                                #
#       F    =   160 MHz :  (λ = 1875 mm)                        #
#                                                                #
#       Hg1  = 3700.0  m       Hg2  = 4503.0  m                  #
#       Ha1  =   25.0  m       Ha2  =   10.0  m                  #
#                                                                #
#       D1   =   57.2 km       D2   =     5.9 km   Hm = 4680.0 m #
#       U    =   -2.60         Ld   =   24.3 dB                  #
#                                                                #
#                                                                #
#       Lfs  = 112.5 dB        Lfs + Ld  = 136.8 dB              #
#                                                                #
#                                                                #
##################################################################
```

PATH PROFILE (4/3 RADIUS)

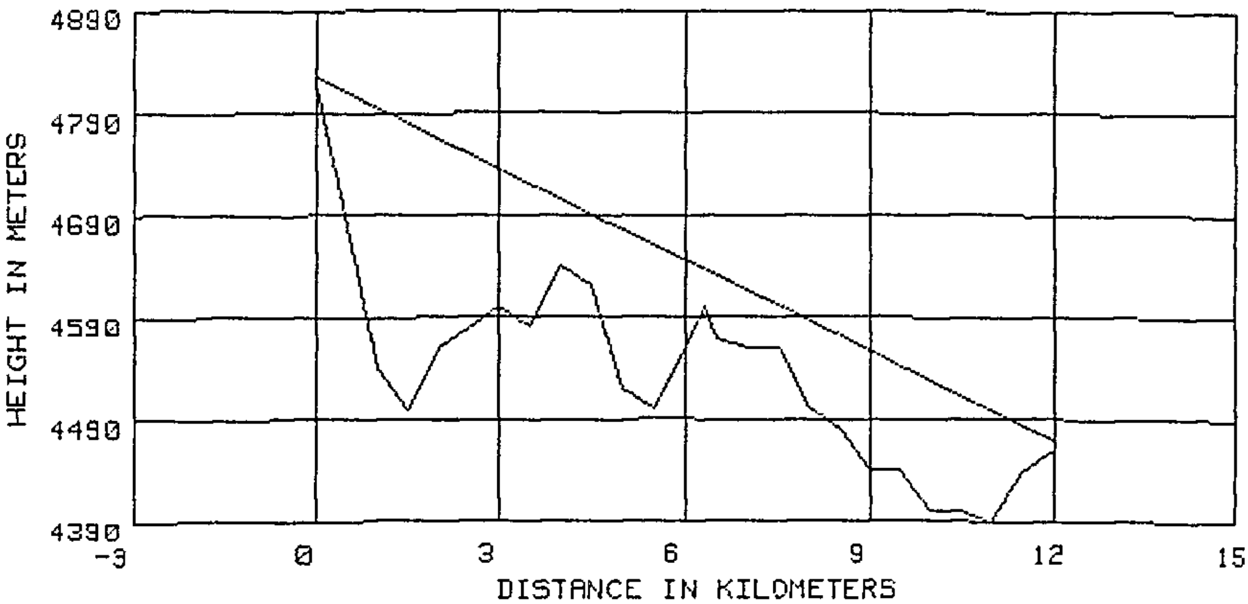


DISTANCE D : 10.4 km

SITE 1 : NEGRO PABALLON	SITE 2 : SANTA FE
GROUND ELEVATION:4820.0 m	GROUND ELEVATION:4380.0 m
ANTENNA HEIGHT: 10.0 m	ANTENNA HEIGHT: 10.0 m

```
######################################################################
#                                                                    #
#                  PATH CLEARANCE AND RIDGE LOSS                     #
#                                                                    #
#        K    =    1.33                                              #
#        F    =  160  MHz :  (λ = 1875 mm)                           #
#        Hg1  = 4820.0  m      Hg2  = 4380.0  m                      #
#        Ha1  =   10   m       Ha2  =    10    m                     #
#                                                                    #
#    1:  D1   =   7.5 km       D2   =    2.9 km    Hm = 4560.0 m     #
#        U    =   -.39         Ld   =  10.7 dB                       #
#    2:  D1   =   9.6 km       D2   =    0.9 km    Hm = 4460.0 m     #
#        U    =   -.69         Ld   =  13.7 dB                       #
#                                                                    #
#        Lfs  =  96.9  dB      Lfs + Ld  = 121.2  dB                 #
#                                                                    #
#                                                                    #
######################################################################
```

PATH PROFILE (4/3 RADIUS)



DISTANCE : 12.0 km

SITE 1 : NEGRO PABELLON

GROUND ELEVATION: 4816.0 m

ANTENNA HEIGHT: 10.0 m

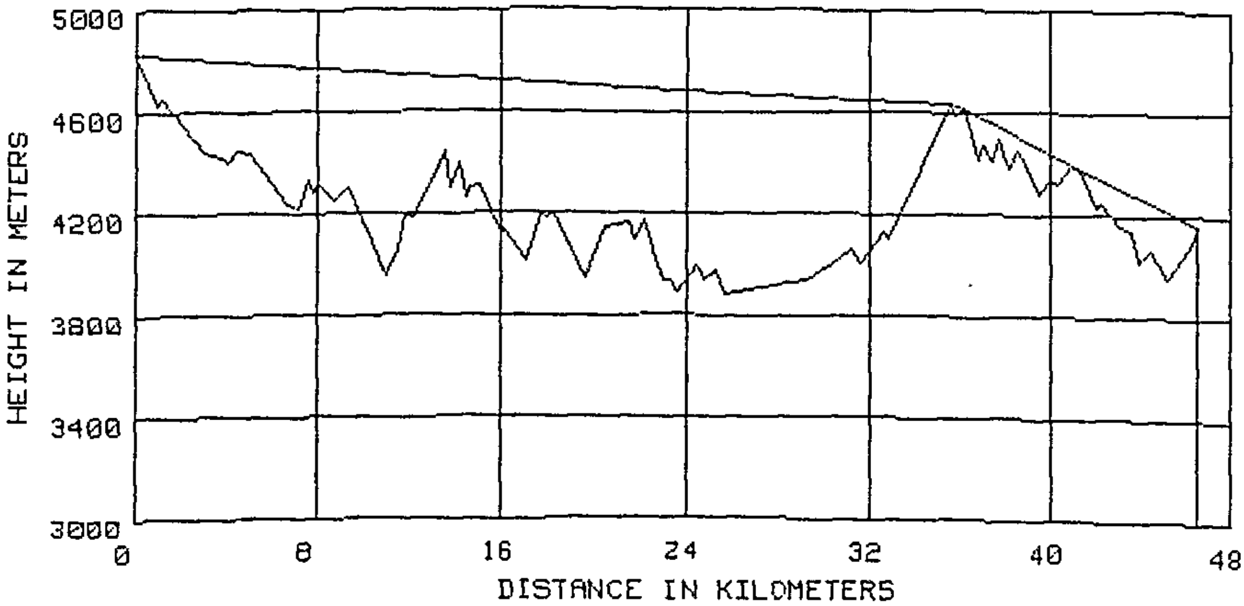
SITE 2 : MOROCOCALA

GROUND ELEVATION: 4460.0 m

ANTENNA HEIGHT: 10.0 m

```
#################################################################
#                                                               #
#                 PATH CLEARANCE AND RIDGE LOSS                 #
#                                                               #
#                                                               #
#      K     =    1.33                                          #
#                                                               #
#      F     =   160 MHz :  (λ = 1875 mm)                       #
#                                                               #
#      Hg1   = 4816.0  m      Hg2  = 4460.0  m                  #
#      Ha1   =   10.0  m      Ha2  =   10.0  m                  #
#                                                               #
#      D1    =    6.3 km      D2   =    5.7 km   Hm = 4600.0 m  #
#      U     =    0.49        Ld   =    0.0 dB                  #
#                                                               #
#                                                               #
#      Lfs   =  98.1 dB       Lfs + Ld  =  98.1 dB              #
#                                                               #
#                                                               #
#################################################################
```

PATH PROFILE (4/3 RADIUS)



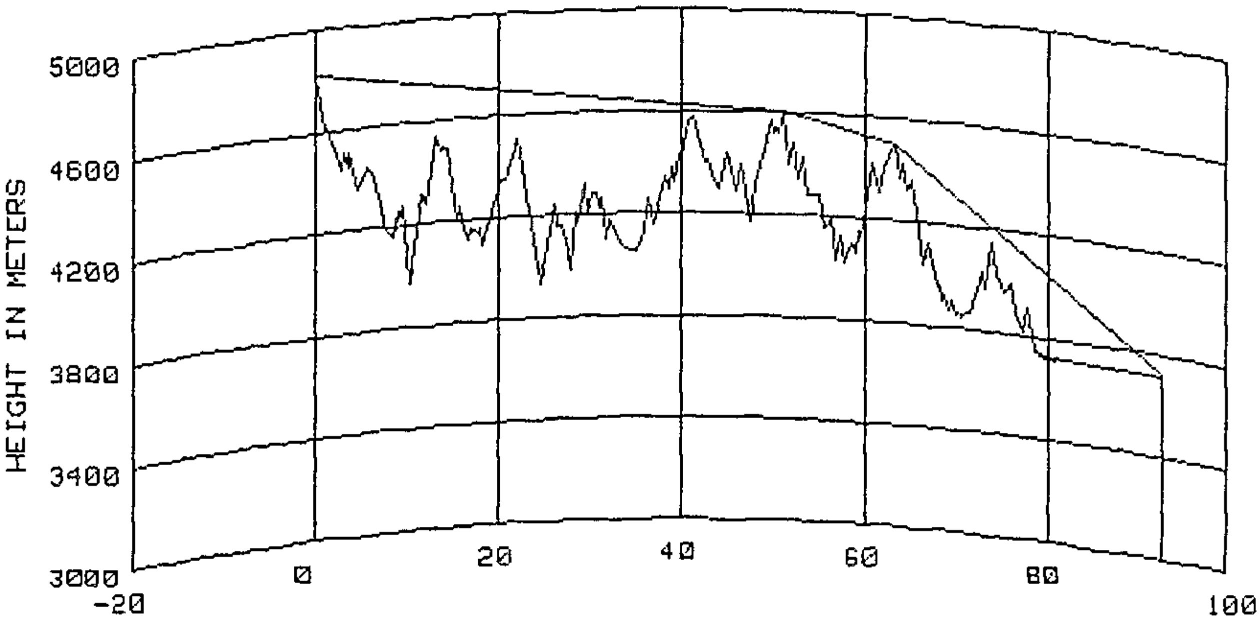
DISTANCE D : 46.5 km

SITE 1 : NEGRO PABELLON
GROUND ELEVATION: 4816.0 m
ANTENNA HEIGHT: 10.0 m

SITE 2 : ANTIQUERA
GROUND ELEVATION: 4160.0 m
ANTENNA HEIGHT: 10.0 m

```
#####################################################################
#                                                                   #
#                  PATH CLEARANCE AND RIDGE LOSS                    #
#                                                                   #
#       K     =    1.33                                             #
#       F     =  160  MHz :  (λ = 1875 mm)                          #
#       Hg1   = 4816.0  m       Hg2  = 4160.0  m                    #
#       Ha1   =   10  m         Ha2  =   10    m                    #
#                                                                   #
#   1:  D1    =  35.6 km        D2   =  10.9 km   Hm = 4630.0 m     #
#       U     =   -.24          Ld   =   8.9 dB                     #
#   2:  D1    =  36.2 km        D2   =  10.3 km   Hm = 4620.0 m     #
#       U     =  -1.40          Ld   =  19.0 dB                     #
#   3:  D1    =  41.0 km        D2   =   5.5 km   Hm = 4400.0 m     #
#       U     =   0.17          Ld   =   3.9 dB                     #
#                                                                   #
#       Lfs   = 109.9  dB      Lfs + Ld  = 141.7  dB                #
#                                                                   #
#                                                                   #
#####################################################################
```

PATH PROFILE (4/3 RADIUS)



DISTANCE D : 92.8 km

SITE 1 : NEGRO PABALLON

GROUND ELEVATION:4816.0 m

ANTENNA HEIGHT: 10.0 m

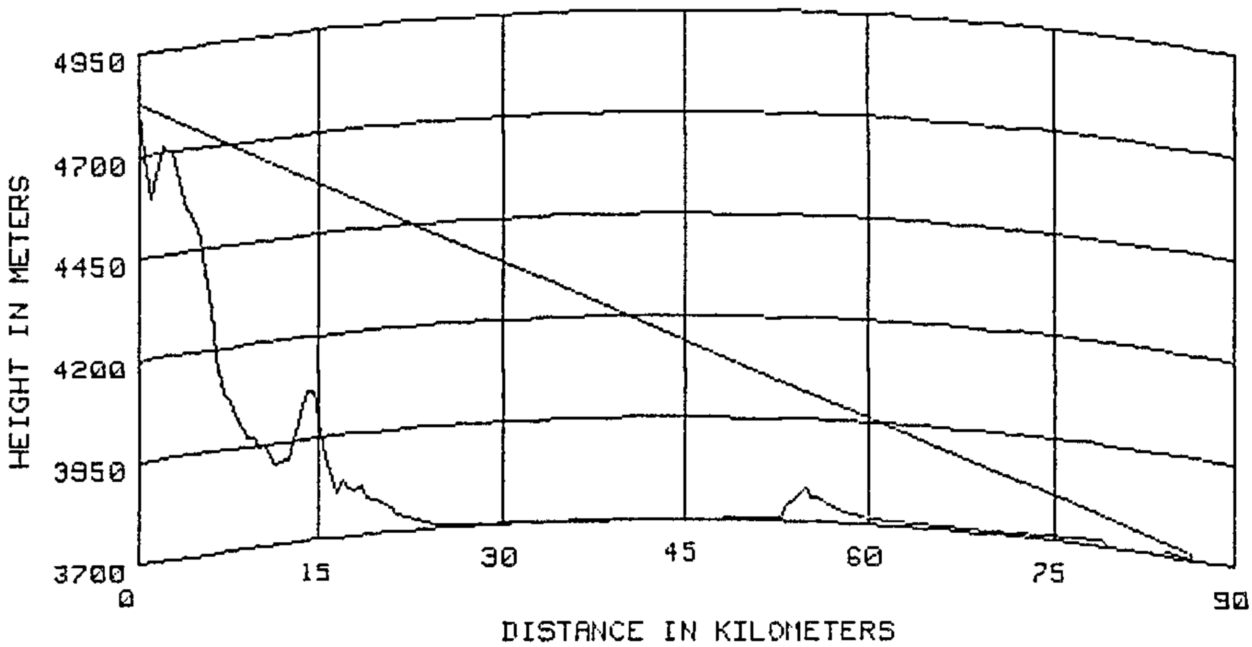
SITE 2 : CHALAPATA

GROUND ELEVATION:3710.0 m

ANTENNA HEIGHT: 10.0 m

```
#################################################################
#                                                               #
#                PATH CLEARANCE AND RIDGE LOSS                  #
#                                                               #
#      K    =    1.33                                           #
#      F    =  160  MHz :  (λ = 1875 mm)                        #
#      Hg1  = 4816.0  m      Hg2  = 3710.0  m                   #
#      Ha1  =   10  m        Ha2  =   10    m                   #
#                                                               #
#   1: D1   =  51.0 km       D2   =  41.8 km   Hm = 4600.0 m    #
#      U    =   -.60         Ld   =  12.8 dB                    #
#   2: D1   =  63.3 km       D2   =  29.5 km   Hm = 4490.0 m    #
#      U    =  -2.03         Ld   =  22.2 dB                    #
#                                                               #
#      Lfs  = 115.9  dB      Lfs + Ld  = 150.9  dB              #
#                                                               #
#                                                               #
#################################################################
```

PATH PROFILE (4/3 RADIUS)

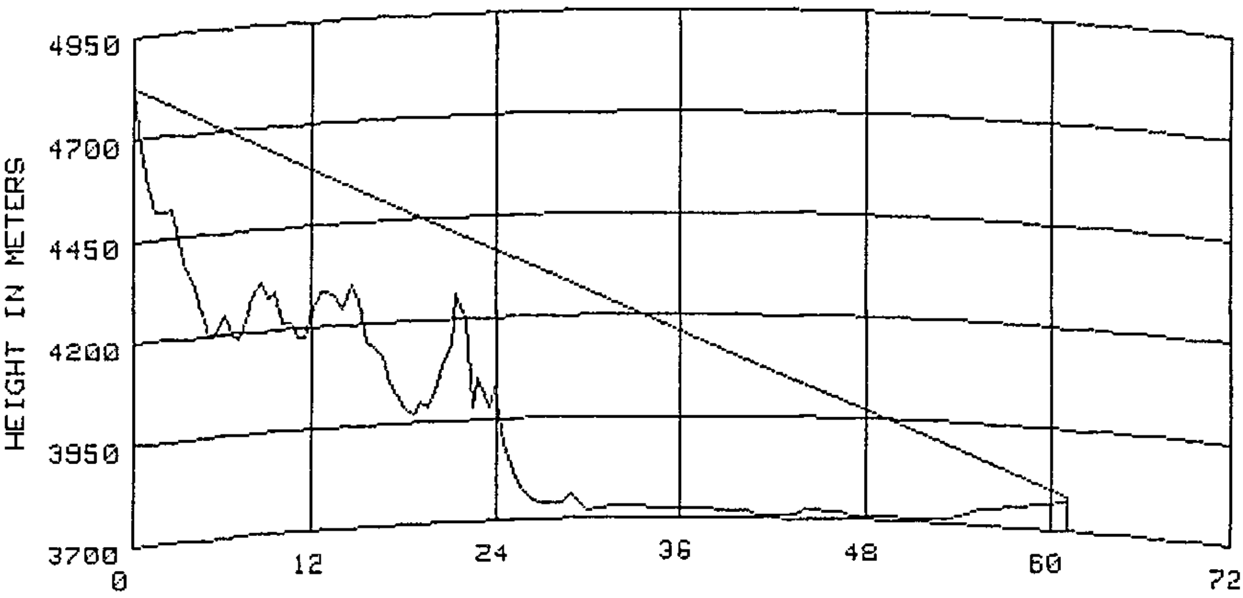


DISTANCE : 86.5 km

SITE 1 : NEGRO PABELLON	SITE 2 : EUCALIPTOS
GROUND ELEVATION: 4816.0 m	GROUND ELEVATION: 3700.0 m
ANTENNA HEIGHT: 10.0 m	ANTENNA HEIGHT: 10.0 m

```
##################################################################
#                                                                #
#                PATH CLEARANCE AND RIDGE LOSS                   #
#                                                                #
#                                                                #
#      K     =    1.33                                           #
#                                                                #
#      F     =   160 MHz :  (λ = 1875 mm)                        #
#                                                                #
#      Hg1   = 4816.0  m       Hg2  = 3700.0  m                  #
#      Ha1   =   10.0  m       Ha2  =   10.0  m                  #
#                                                                #
#      D1    =   84.5 km       D2   =     2.0 km   Hm = 3720.0 m #
#      U     =    0.10         Ld   =     4.8 dB                 #
#                                                                #
#                                                                #
#      Lfs   = 115.3 dB        Lfs + Ld   = 120.1 dB             #
#                                                                #
#                                                                #
##################################################################
```

PATH PROFILE (4/3 RADIUS)

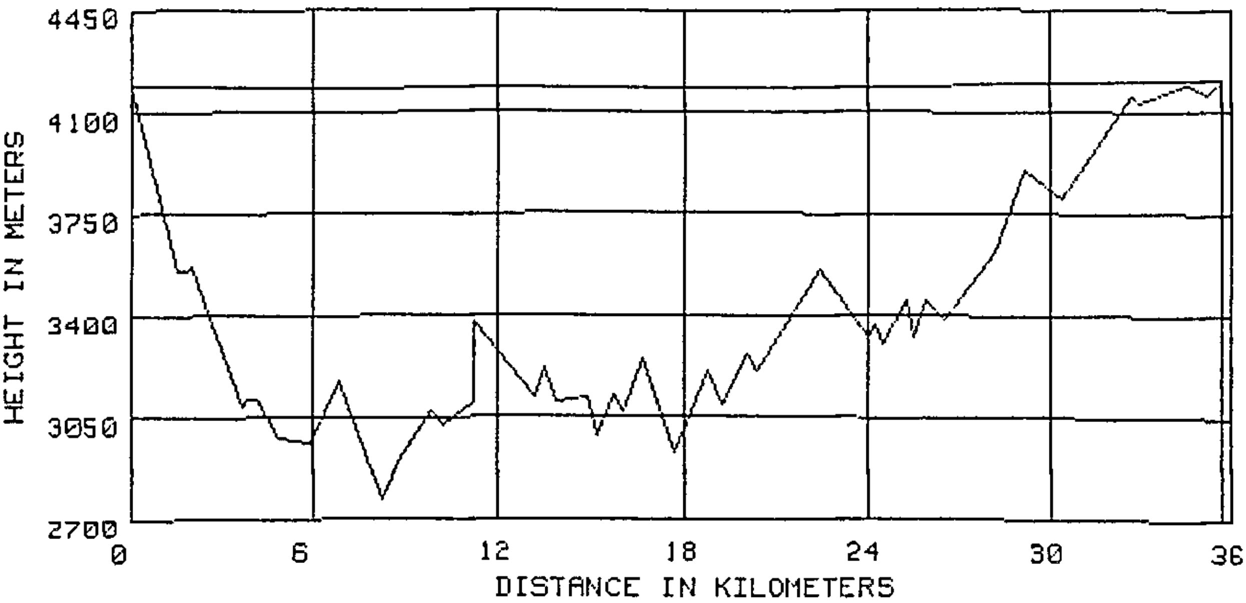


DISTANCE : 61.1 km

SITE 1 : NEGRO PABELLON	SITE 2 : CARACOLLO
GROUND ELEVATION: 4816.0 m	GROUND ELEVATION: 3770.0 m
ANTENNA HEIGHT: 10.0 m	ANTENNA HEIGHT: 10.0 m

```
######################################################################
#                                                                    #
#                  PATH CLEARANCE AND RIDGE LOSS                     #
#                                                                    #
#                                                                    #
#       K    =    1.33                                               #
#                                                                    #
#       F    =   160 MHz :  (λ = 1875 mm)                            #
#                                                                    #
#       Hg1  = 4816.0  m       Hg2  = 3770.0  m                      #
#       Ha1  =   10.0  m       Ha2  =   10.0  m                      #
#                                                                    #
#       D1   =   56.0 km       D2   =    5.1 km   Hm = 3750.0 m      #
#       U    =    1.07         Ld   =    0.0 dB                      #
#                                                                    #
#                                                                    #
#       Lfs  = 112.3 dB        Lfs + Ld  = 112.3 dB                  #
#                                                                    #
#                                                                    #
######################################################################
```

PATH PROFILE (4/3 RADIUS)

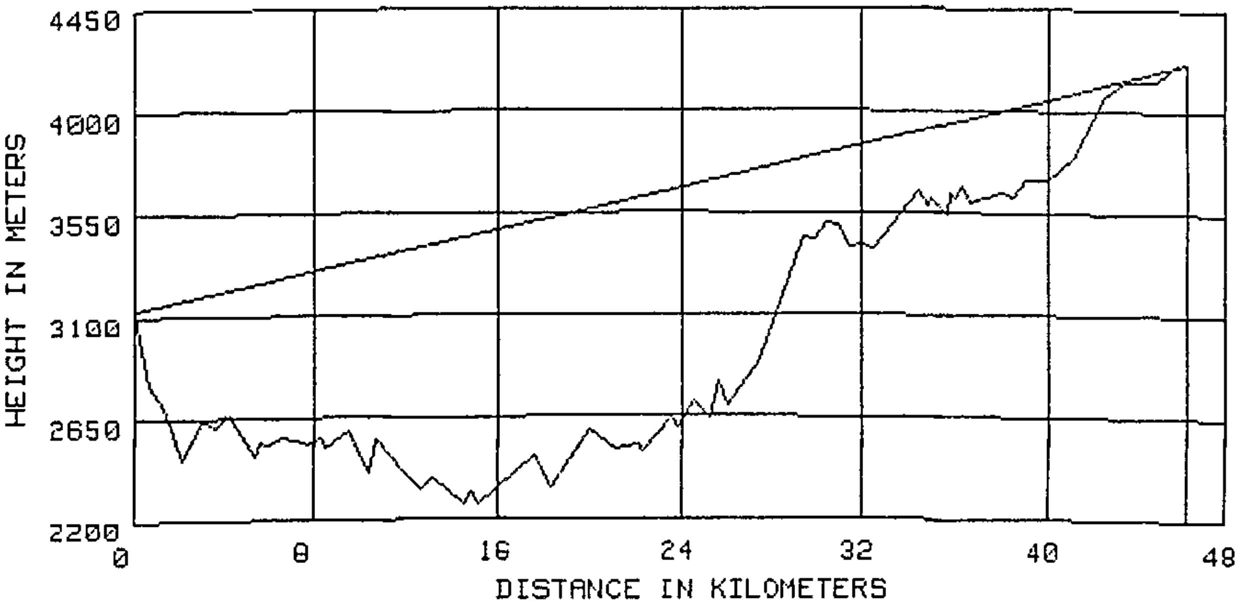


DISTANCE : 35.7 km

SITE 1 : Cerro TUTI		SITE 2 : Cerro CURUBANBA	
GROUND ELEVATION:	4183.0 m	GROUND ELEVATION:	4200.0 m
ANTENNA HEIGHT:	10.0 m	ANTENNA HEIGHT:	10.0 m

```
######################################################################
#                                                                    #
#                PATH CLEARANCE AND RIDGE LOSS                       #
#                                                                    #
#                                                                    #
#       K     =     1.33                                             #
#                                                                    #
#       F     =    160 MHz :  (λ = 1875 mm)                          #
#                                                                    #
#       Hg1   = 4183.0  m      Hg2  = 4200.0  m                      #
#       Ha1   =   10.0  m      Ha2  =   10.0  m                      #
#                                                                    #
#       D1    =    34.5 km     D2   =     1.2 km   Hm = 4190.0 m     #
#       U     =     0.36       Ld   =     1.7 dB                     #
#                                                                    #
#                                                                    #
#       Lfs   = 107.6 dB       Lfs + Ld  = 109.3 dB                  #
#                                                                    #
#                                                                    #
######################################################################
```

PATH PROFILE (4/3 RADIUS)



DISTANCE : 46.3 km

SITE 1 : TUNTURI

GROUND ELEVATION: 3120.0 m

ANTENNA HEIGHT: 10.0 m

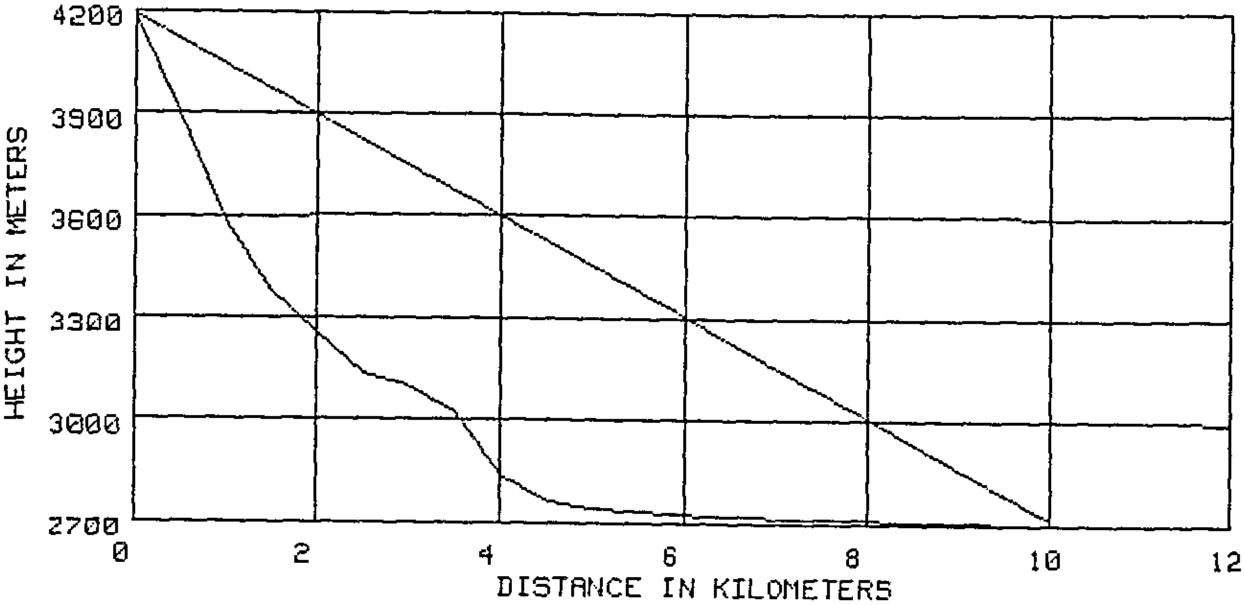
SITE 2 : Cerro CURUBANBA

GROUND ELEVATION: 4200.0 m

ANTENNA HEIGHT: 10.0 m

```
##############################################################
#                                                            #
#              PATH CLEARANCE AND RIDGE LOSS                 #
#                                                            #
#                                                            #
#     K     =     1.33                                       #
#                                                            #
#     F     =    160 MHz :  (λ = 1875 mm)                    #
#                                                            #
#     Hg1   = 3120.0  m       Hg2   = 4200.0  m              #
#     Ha1   =   10.0  m       Ha2   =   10.0  m              #
#                                                            #
#     D1    =   46.0 km       D2    =    0.3 km   Hm = 4225.0 m  #
#     U     =    -.96         Ld    =   16.1 dB              #
#                                                            #
#                                                            #
#     Lfs   = 109.9 dB        Lfs + Ld  = 125.9 dB           #
#                                                            #
#                                                            #
##############################################################
```

PATH PROFILE (4/3 RADIUS)



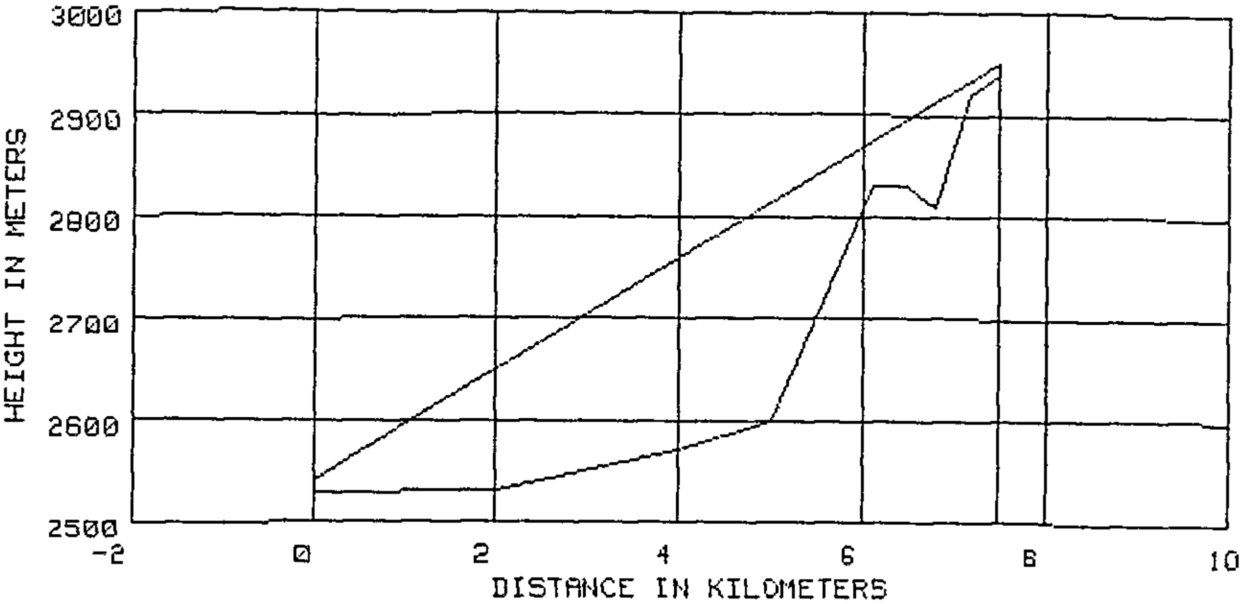
DISTANCE : 10.0 km

SITE 1 : Cerro TUTI
GROUND ELEVATION: 4183.0 m
ANTENNA HEIGHT: 10.0 m

SITE 2 : PUNATA
GROUND ELEVATION: 2700.0 m
ANTENNA HEIGHT: 10.0 m

```
######################################################################
#                                                                    #
#                  PATH CLEARANCE AND RIDGE LOSS                     #
#                                                                    #
#                                                                    #
#       K     =    1.33                                              #
#                                                                    #
#       F     =   900 MHz :  (λ =  333 mm)                           #
#                                                                    #
#       Hg1   = 4183.0  m       Hg2   = 2700.0  m                    #
#       Ha1   =   10.0  m       Ha2   =   10.0  m                    #
#                                                                    #
#       D1    =    9.5 km       D2    =    0.5 km   Hm = 2720.0 m    #
#       U     =    5.08         Ld    =    0.0 dB                    #
#                                                                    #
#                                                                    #
#       Lfs   = 111.5 dB        Lfs + Ld  = 111.5 dB                 #
#                                                                    #
#                                                                    #
######################################################################
```

PATH PROFILE (4/3 RADIUS)

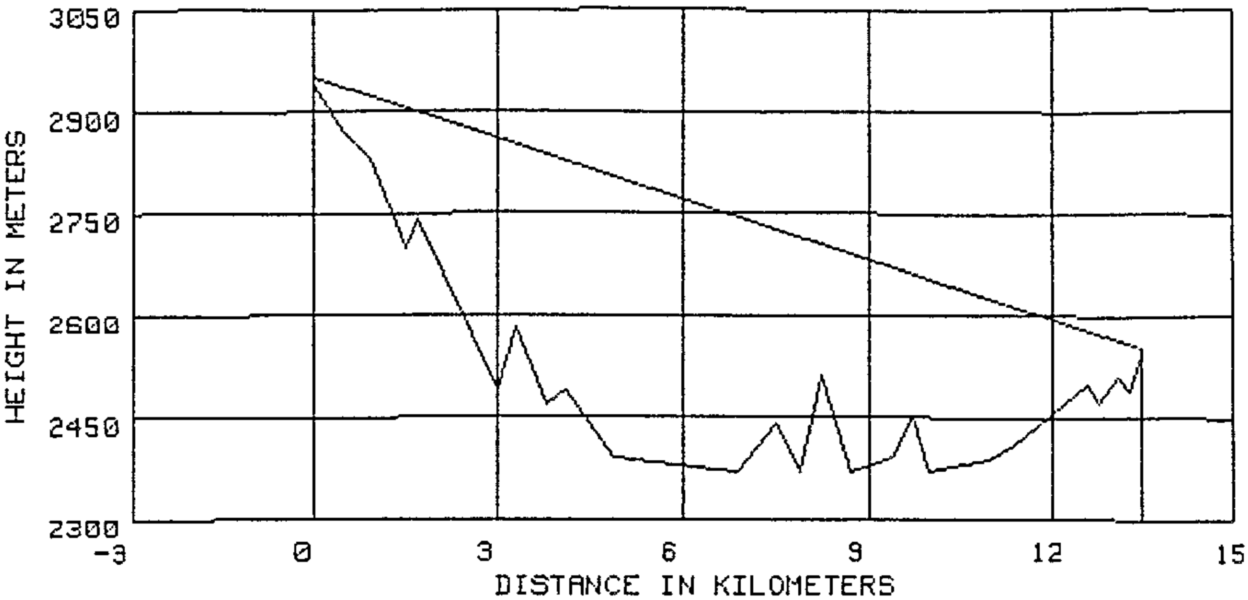


DISTANCE : 7.5 km

SITE 1 : SANTIBANEZ	SITE 2 : Rep. SANTIBANEZ
GROUND ELEVATION: 2530.0 m	GROUND ELEVATION: 2940.0 m
ANTENNA HEIGHT: 10.0 m	ANTENNA HEIGHT: 10.0 m

```
###################################################################
#                                                                 #
#                PATH CLEARANCE AND RIDGE LOSS                    #
#                                                                 #
#                                                                 #
#       K     =    1.33                                           #
#                                                                 #
#       F     =   160 MHz :  (λ = 1875 mm)                        #
#                                                                 #
#       Hg1   = 2530.0  m       Hg2  = 2940.0  m                  #
#       Ha1   =   10.0  m       Ha2  =   10.0  m                  #
#                                                                 #
#       D1    =    7.2 km       D2   =    0.3 km   Hm = 2940.0 m  #
#       U     =    -.28         Ld   =    9.4 dB                  #
#                                                                 #
#                                                                 #
#       Lfs   =  94.0 dB        Lfs + Ld  = 103.5 dB              #
#                                                                 #
#                                                                 #
###################################################################
```

PATH PROFILE (4/3 RADIUS)



DISTANCE : 13.5 km

SITE 1 : Rep. SANTIBANEZ		SITE 2 : CAPINOTA	
GROUND ELEVATION:	2940.0 m	GROUND ELEVATION:	2544.0 m
ANTENNA HEIGHT:	10.0 m	ANTENNA HEIGHT:	10.0 m

PATH CLEARANCE AND RIDGE LOSS

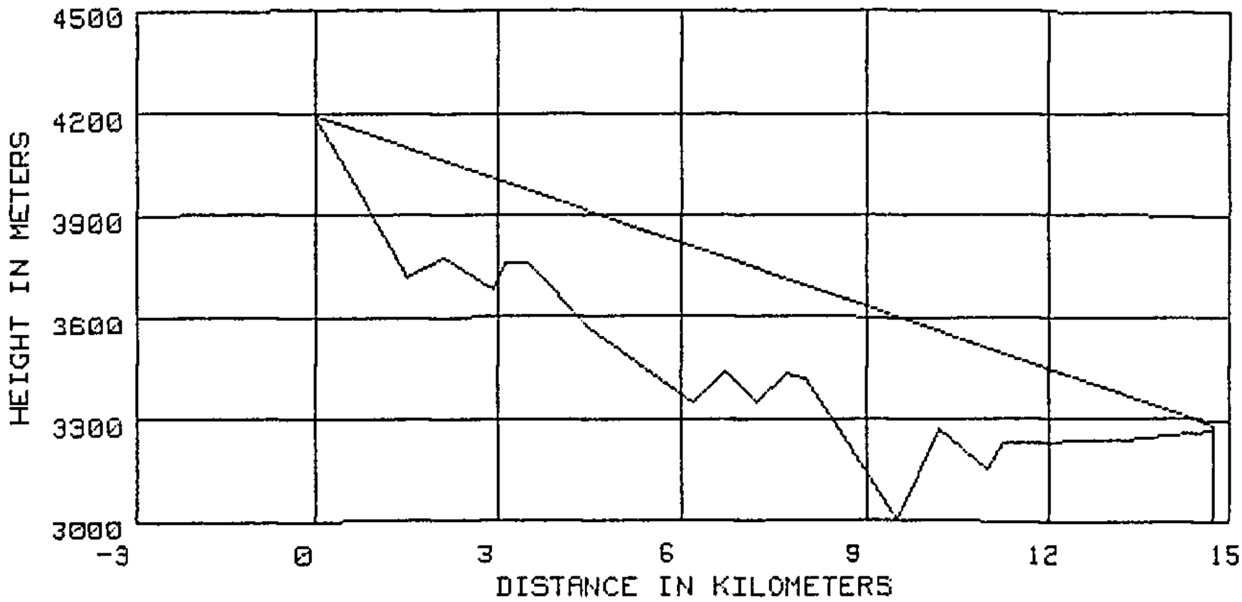
K = 1.33

F = 160 MHz : (λ = 1875 mm)

Hg1	= 2940.0 m	Hg2	= 2544.0 m		
Ha1	= 10.0 m	Ha2	= 10.0 m		
D1	= 13.1 km	D2	= 0.4 km	Hm = 2530.0 m	
U	= 1.31	Ld	= 1.1 dB		

Lfs = 99.1 dB   Lfs + Ld = 100.2 dB

PATH PROFILE (4/3 RADIUS)



DISTANCE : 14.7 km

SITE 1 : Cerro TUTI

GROUND ELEVATION: 4183.0 m

ANTENNA HEIGHT: 10.0 m

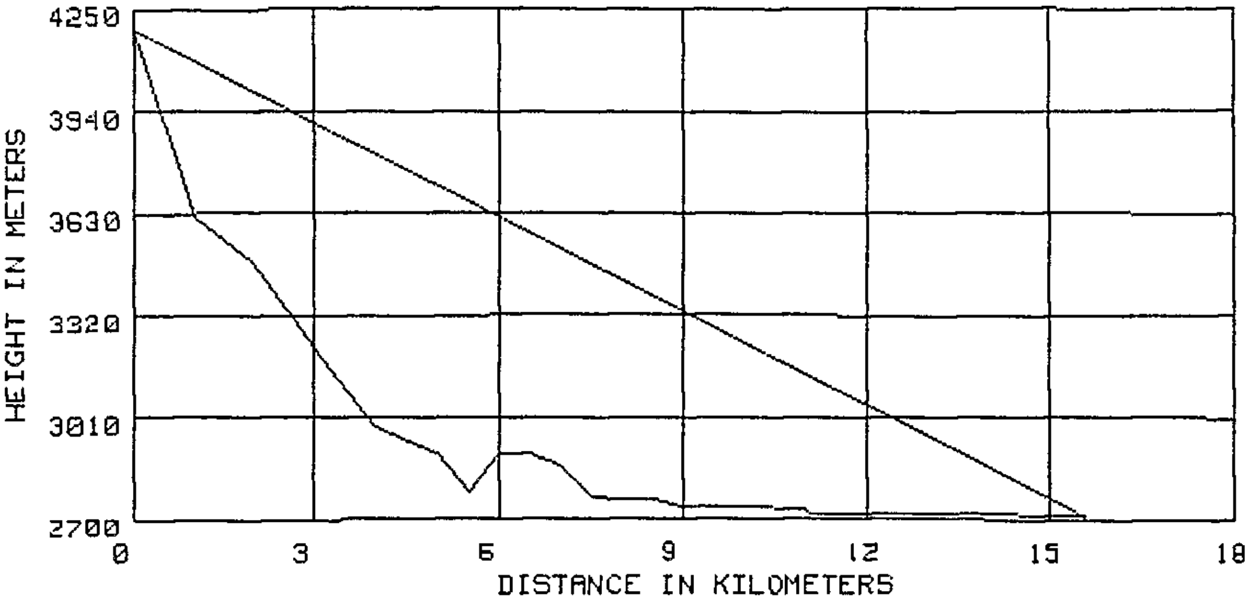
SITE 2 : TIRAQUE

GROUND ELEVATION: 3270.0 m

ANTENNA HEIGHT: 10.0 m

```
###################################################################
#                                                                 #
#                  PATH CLEARANCE AND RIDGE LOSS                  #
#                                                                 #
#                                                                 #
#      K     =    1.33                                            #
#                                                                 #
#      F     =   160 MHz :  (λ = 1875 mm)                         #
#                                                                 #
#      Hg1   = 4183.0  m       Hg2  = 3270.0  m                   #
#      Ha1   =   10.0  m       Ha2  =   10.0  m                   #
#                                                                 #
#      D1    =   13.2 km       D2   =    1.5 km    Hm = 3250.0 m  #
#      U     =    2.43         Ld   =    0.0 dB                     #
#                                                                 #
#                                                                 #
#      Lfs   =  99.9 dB        Lfs + Ld  =  99.9 dB               #
#                                                                 #
#                                                                 #
###################################################################
```

PATH PROFILE (4/3 RADIUS)

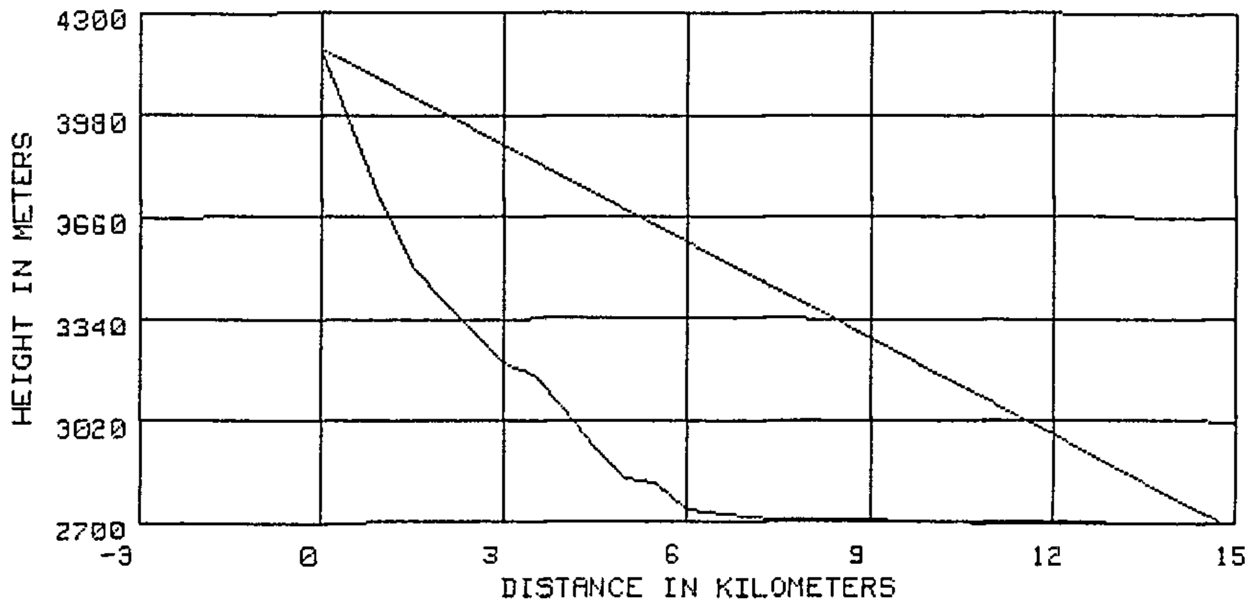


DISTANCE : 15.5 km

SITE 1 : Cerro TUTI		SITE 2 : ARANI	
GROUND ELEVATION:	4183.0 m	GROUND ELEVATION:	2710.0 m
ANTENNA HEIGHT:	10.0 m	ANTENNA HEIGHT:	10.0 m

```
######################################################################
#                                                                    #
#                  PATH CLEARANCE AND RIDGE LOSS                     #
#                                                                    #
#                                                                    #
#       K     =    1.33                                              #
#                                                                    #
#       F     =   160 MHz :  (λ = 1875 mm)                           #
#                                                                    #
#       Hg1   = 4183.0  m       Hg2  = 2710.0  m                     #
#       Ha1   =   10.0  m       Ha2  =   10.0  m                     #
#                                                                    #
#       D1    =   15.0 km       D2   =     0.5 km   Hm = 2730.0 m    #
#       U     =    1.23         Ld   =     0.0 dB                    #
#                                                                    #
#                                                                    #
#       Lfs   = 100.3 dB        Lfs + Ld  = 100.3 dB                 #
#                                                                    #
#                                                                    #
######################################################################
```

PATH PROFILE (4/3 RADIUS)

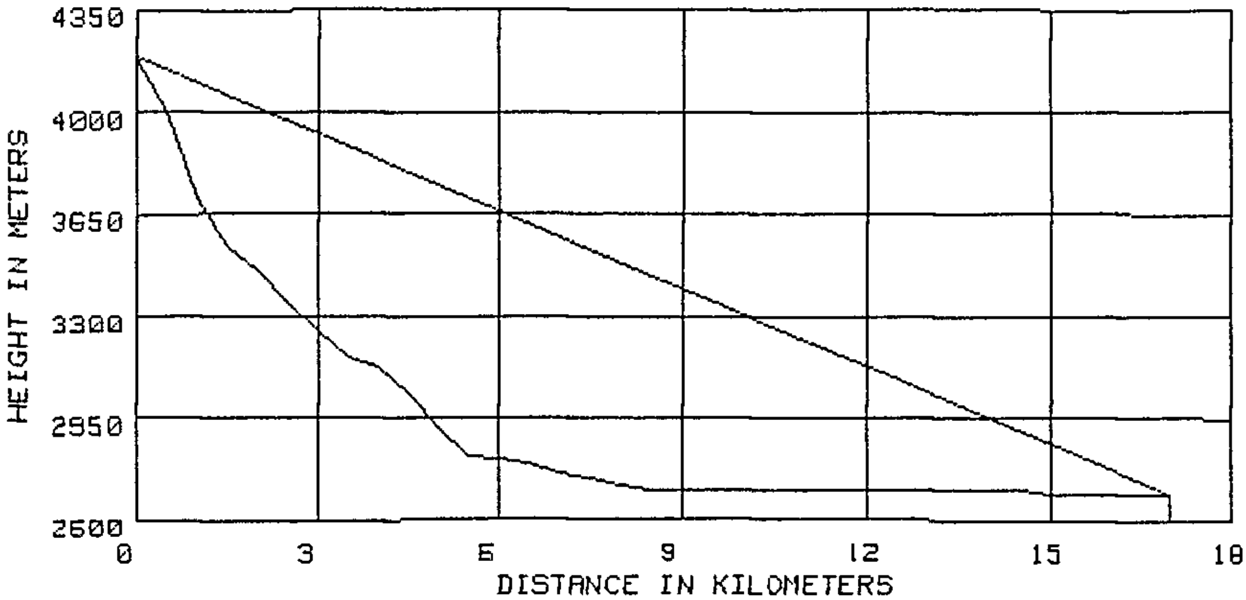


DISTANCE : 14.7 km

SITE 1 : Cerro TUTI		SITE 2 : UCURENA	
GROUND ELEVATION:	4183.0 m	GROUND ELEVATION:	2700.0 m
ANTENNA HEIGHT:	10.0 m	ANTENNA HEIGHT:	10.0 m

```
################################################################
#                                                              #
#               PATH CLEARANCE AND RIDGE LOSS                  #
#                                                              #
#                                                              #
#      K     =    1.33                                         #
#                                                              #
#      F     =   160 MHz :  (λ = 1875 mm)                      #
#                                                              #
#      Hg1   = 4183.0  m       Hg2  = 2700.0  m                #
#      Ha1   =   10.0  m       Ha2  =   10.0  m                #
#                                                              #
#      D1    =   14.5 km       D2   =    0.2 km   Hm = 2720.0 m #
#      U     =    0.52         Ld   =    0.0 dB               #
#                                                              #
#                                                              #
#      Lfs   =  99.9 dB        Lfs + Ld  =  99.9 dB            #
#                                                              #
#                                                              #
################################################################
```

PATH PROFILE (4/3 RADIUS)

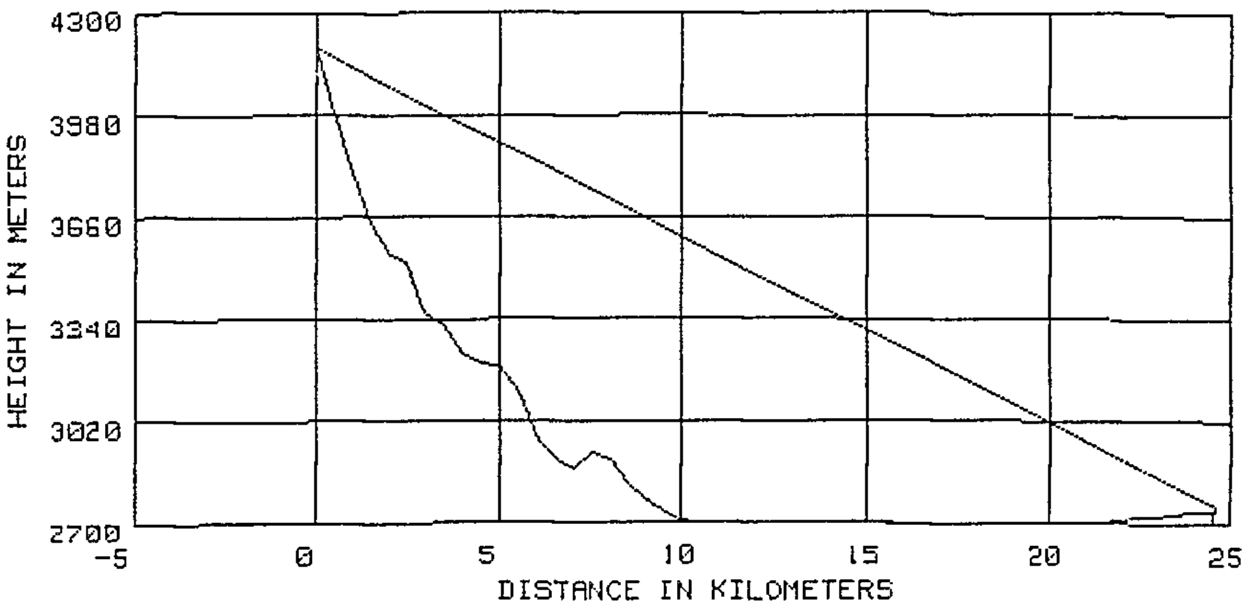


DISTANCE : 16.9 km

SITE 1 : Cerro TUTI	SITE 2 : CLIZA
GROUND ELEVATION: 4183.0 m	GROUND ELEVATION: 2690.0 m
ANTENNA HEIGHT: 10.0 m	ANTENNA HEIGHT: 10.0 m

```
#################################################################
#                                                               #
#                PATH CLEARANCE AND RIDGE LOSS                  #
#                                                               #
#                                                               #
#      K     =    1.33                                          #
#                                                               #
#      F     =   160 MHz :  (λ = 1875 mm)                       #
#                                                               #
#      Hg1   = 4183.0  m       Hg2  = 2690.0  m                 #
#      Ha1   =   10.0  m       Ha2  =   10.0  m                 #
#                                                               #
#      D1    =   16.0 km       D2   =    0.9 km   Hm = 2710.0 m #
#      U     =    1.72         Ld   =    0.0 dB                 #
#                                                               #
#                                                               #
#      Lfs   = 101.1 dB        Lfs + Ld  = 101.1 dB             #
#                                                               #
#                                                               #
#################################################################
```

PATH PROFILE (4/3 RADIUS)

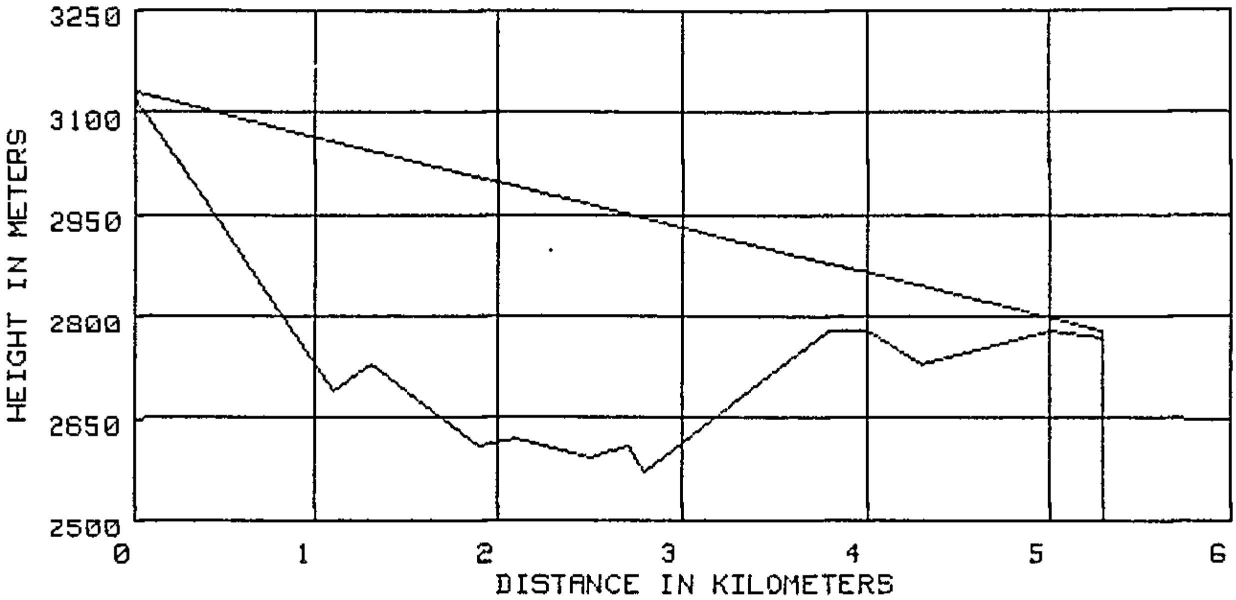


DISTANCE : 24.6 km

SITE 1 : Cerro TUTI	SITE 2 : TARATA
GROUND ELEVATION: 4183.0 m	GROUND ELEVATION: 2740.0 m
ANTENNA HEIGHT: 10.0 m	ANTENNA HEIGHT: 10.0 m

```
#################################################################
#                                                               #
#               PATH CLEARANCE AND RIDGE LOSS                   #
#                                                               #
#                                                               #
#      K     =     1.33                                         #
#                                                               #
#      F     =   160 MHz :  (λ = 1875 mm)                       #
#                                                               #
#      Hg1   = 4183.0  m       Hg2  = 2740.0  m                 #
#      Ha1   =   10.0  m       Ha2  =   10.0  m                 #
#                                                               #
#      D1    =   24.0 km       D2   =    0.6 km   Hm = 2760.0 m #
#      U     =    0.73         Ld   =    0.0 dB                 #
#                                                               #
#                                                               #
#      Lfs   = 104.4 dB        Lfs + Ld  = 104.4 dB             #
#                                                               #
#                                                               #
#################################################################
```

PATH PROFILE (4/3 RADIUS)

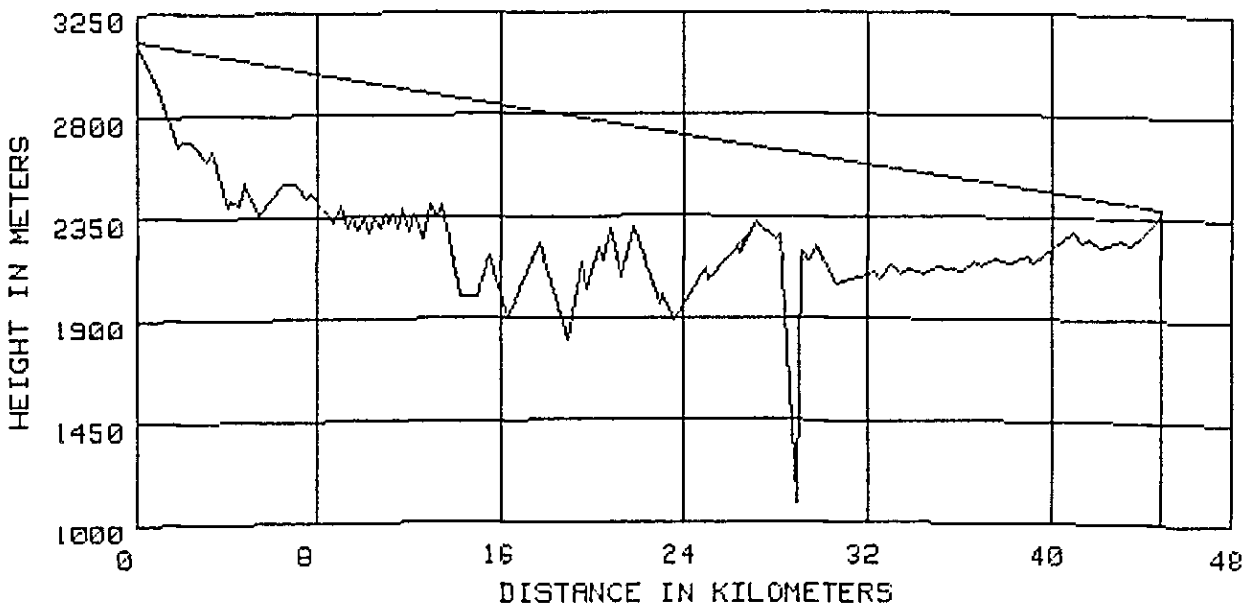


DISTANCE : 5.3 km

SITE 1 : TUNTURI	SITE 2 : TOTORA
GROUND ELEVATION: 3120.0 m	GROUND ELEVATION: 2770.0 m
ANTENNA HEIGHT: 10.0 m	ANTENNA HEIGHT: 10.0 m

```
#####################################################################
#                                                                   #
#                  PATH CLEARANCE AND RIDGE LOSS                    #
#                                                                   #
#                                                                   #
#       K     =     1.33                                            #
#                                                                   #
#       F     =    160 MHz :  (λ = 1875 mm)                         #
#                                                                   #
#       Hg1   = 3120.0  m       Hg2  = 2770.0  m                    #
#       Ha1   =   10.0  m       Ha2  =   10.0  m                    #
#                                                                   #
#       D1    =    5.0 km       D2   =    0.3 km   Hm = 2800.0 m    #
#       U     =    -.01         Ld   =    6.2 dB                    #
#                                                                   #
#                                                                   #
#       Lfs   =  91.0 dB        Lfs + Ld  =  97.2 dB                #
#                                                                   #
#                                                                   #
#####################################################################
```

PATH PROFILE (4/3 RADIUS)

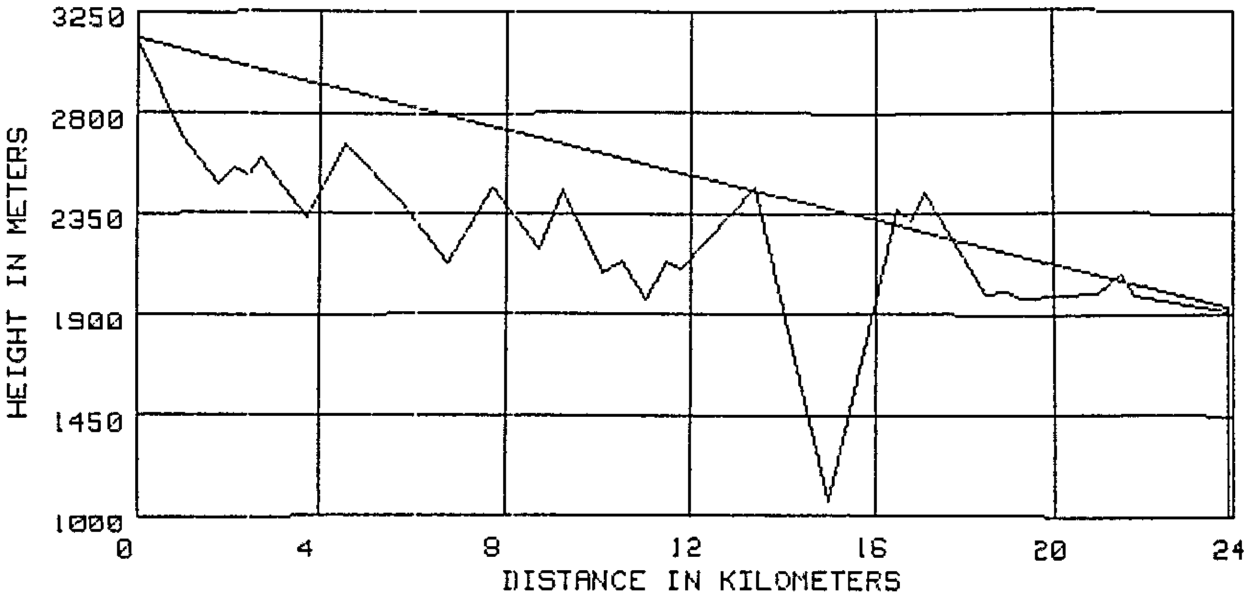


DISTANCE : 44.9 km

SITE 1 : TUNTURI	SITE 2 : AIQUILE
GROUND ELEVATION: 3120.0 m	GROUND ELEVATION: 2380.0 m
ANTENNA HEIGHT: 10.0 m	ANTENNA HEIGHT: 10.0 m

```
##################################################################
#                                                                #
#                  PATH CLEARANCE AND RIDGE LOSS                 #
#                                                                #
#                                                                #
#       K     =     1.33                                         #
#                                                                #
#       F     =    160 MHz ;  (λ = 1875 mm)                      #
#                                                                #
#       Hg1   = 3120.0   m       Hg2   = 2380.0   m              #
#       Ha1   =   10.0   m       Ha2   =   10.0   m              #
#                                                                #
#       D1    =    44.7 km       D2    =     0.2 km   Hm = 2360.0 m  #
#       U     =     1.70         Ld    =     0.0 dB              #
#                                                                #
#                                                                #
#       Lfs   = 109.6 dB         Lfs + Ld   = 109.6 dB           #
#                                                                #
#                                                                #
##################################################################
```

PATH PROFILE (4/3 RADIUS)

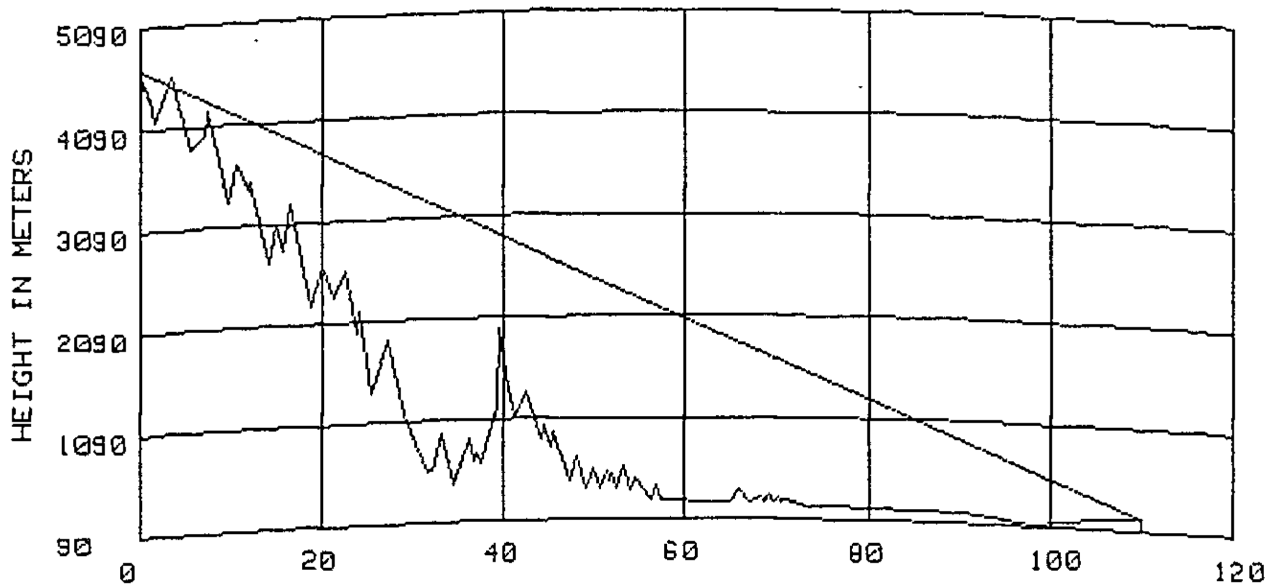


DISTANCE : 23.9 km

SITE 1 :	TUNTURI	SITE 2 :	MIZQUE
GROUND ELEVATION:	3120.0 m	GROUND ELEVATION:	1910.0 m
ANTENNA HEIGHT:	10.0 m	ANTENNA HEIGHT:	20.0 m

```
#####################################################################
#                                                                   #
#                  PATH CLEARANCE AND RIDGE LOSS                    #
#                                                                   #
#                                                                   #
#       K     =    1.33                                             #
#                                                                   #
#       F     =   160 MHz :  (λ = 1875 mm)                          #
#                                                                   #
#       Hg1   = 3120.0  m      Hg2  = 1910.0  m                     #
#       Ha1   =   10.0  m      Ha2  =   10.0  m                     #
#                                                                   #
#       D1    =   17.1 km      D2   =    6.8 km   Hm = 2470.0 m     #
#       U     =   -2.23        Ld   =   22.9 dB                     #
#                                                                   #
#                                                                   #
#       Lfs   = 104.1 dB       Lfs + Ld  = 127.1 dB                 #
#                                                                   #
#                                                                   #
#####################################################################
```

PATH PROFILE (4/3 RADIUS)



DISTANCE :109.9 km

SITE 1 : JUNO

GROUND ELEVATION: 4658.0 m

ANTENNA HEIGHT: 10.0 m

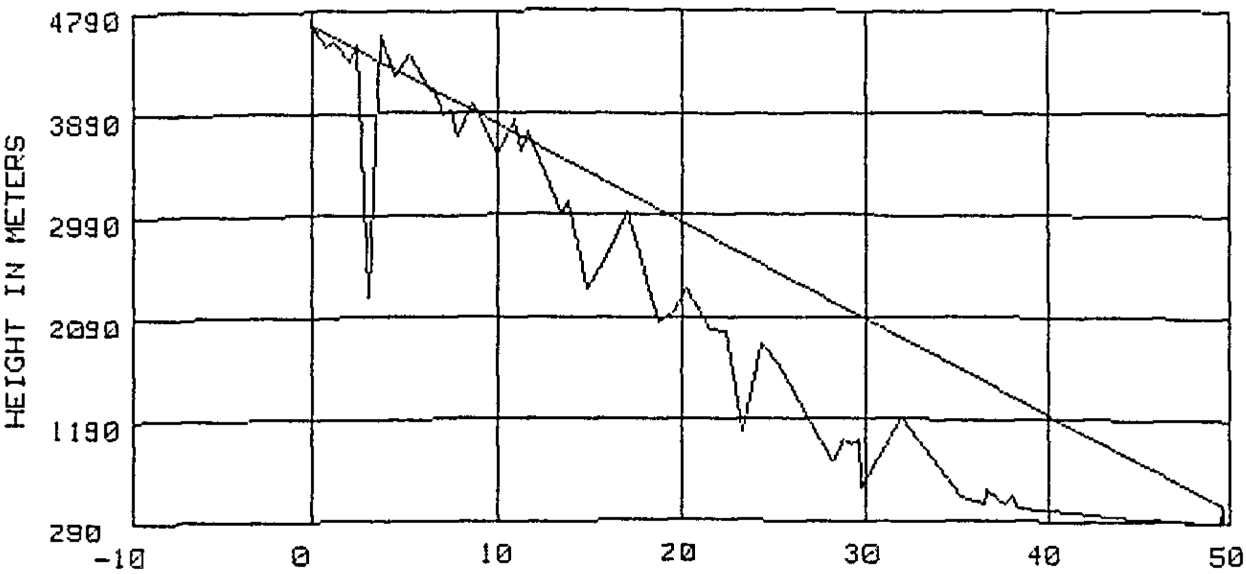
SITE 2 : PUERTO VILLAROEL

GROUND ELEVATION: 190.0 m

ANTENNA HEIGHT: 10.0 m

```
####################################################################
#                                                                  #
#                 PATH CLEARANCE AND RIDGE LOSS                    #
#                                                                  #
#                                                                  #
#       K     =    1.33                                            #
#                                                                  #
#       F     =   160 MHz :  (λ = 1875 mm)                         #
#                                                                  #
#       Hg1   = 4658.0  m      Hg2   =  190.0  m                   #
#       Ha1   =   10.0  m      Ha2   =   10.0  m                   #
#                                                                  #
#       D1    =    3.5 km      D2    =  106.4 km   Hm = 4590.0 m   #
#       U     =   -1.08        Ld    =   16.9 dB                   #
#                                                                  #
#                                                                  #
#       Lfs   = 117.4 dB       Lfs + Ld  = 134.3 dB                #
#                                                                  #
#                                                                  #
####################################################################
```

PATH PROFILE (4/3 RADIUS)



DISTANCE : 49.6 km

SITE 1 : JUNO

GROUND ELEVATION: 4658.0 m

ANTENNA HEIGHT: 10.0 m

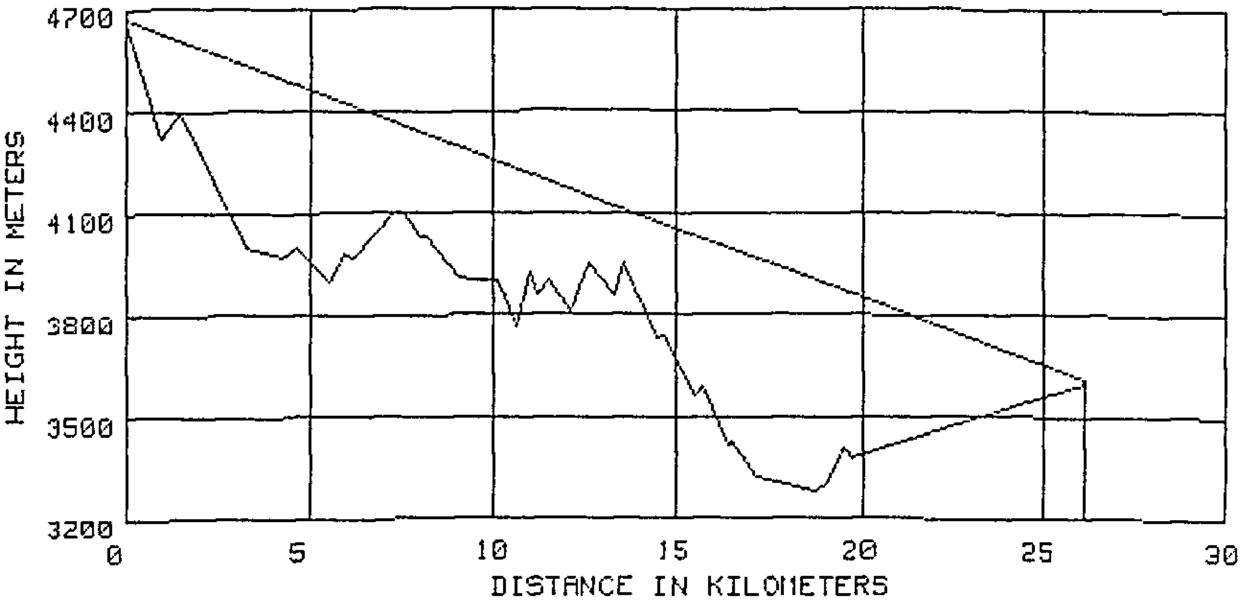
SITE 2 : VILLA TUNARI

GROUND ELEVATION: 429.0 m

ANTENNA HEIGHT: 10.0 m

```
#################################################################
#                                                               #
#                PATH CLEARANCE AND RIDGE LOSS                  #
#                                                               #
#                                                               #
#       K     =    1.33                                         #
#                                                               #
#       F     =   160 MHz :  (λ = 1875 mm)                      #
#                                                               #
#       Hg1   = 4658.0  m      Hg2  =  429.0  m                 #
#       Ha1   =   10.0  m      Ha2  =   10.0  m                 #
#                                                               #
#       D1    =    3.7 km      D2   =   45.9 km   Hm = 4570.0 m #
#       U     =   -2.84        Ld   =   25.1 dB                 #
#                                                               #
#                                                               #
#       Lfs   = 110.4 dB       Lfs + Ld  = 135.5 dB             #
#                                                               #
#                                                               #
#################################################################
```

PATH PROFILE (4/3 RADIUS)

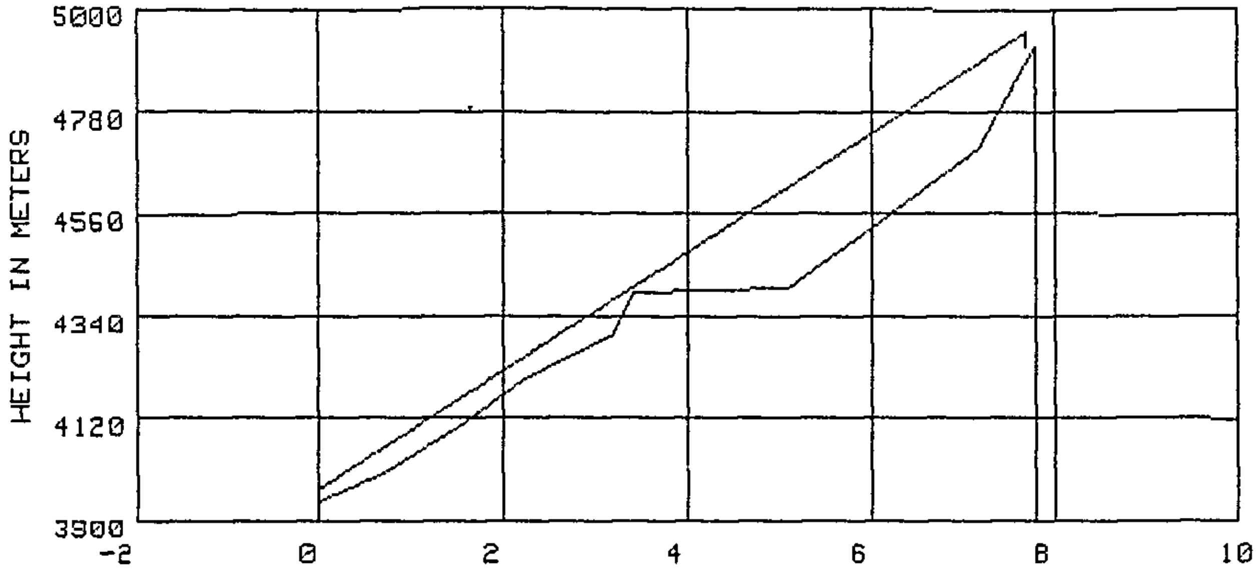


DISTANCE : 26.1 km

SITE 1 : JUNO	SITE 2 : COLOMI
GROUND ELEVATION: 4658.0 m	GROUND ELEVATION: 3600.0 m
ANTENNA HEIGHT: 10.0 m	ANTENNA HEIGHT: 10.0 m

```
##################################################################
#                                                                #
#                PATH CLEARANCE AND RIDGE LOSS                   #
#                                                                #
#                                                                #
#       K     =    1.33                                          #
#                                                                #
#       F     =   160 MHz :  (λ = 1875 mm)                       #
#                                                                #
#       Hg1   = 4658.0  m      Hg2  = 3600.0  m                  #
#       Ha1   =   10.0  m      Ha2  =   10.0  m                  #
#                                                                #
#       D1    =   13.6 km      D2   =   12.5 km   Hm = 3960.0 m  #
#       U     =    1.33        Ld   =    1.1 dB                  #
#                                                                #
#                                                                #
#       Lfs   = 104.9 dB       Lfs + Ld  = 106.0 dB              #
#                                                                #
#                                                                #
##################################################################
```

PATH PROFILE (4/3 RADIUS)

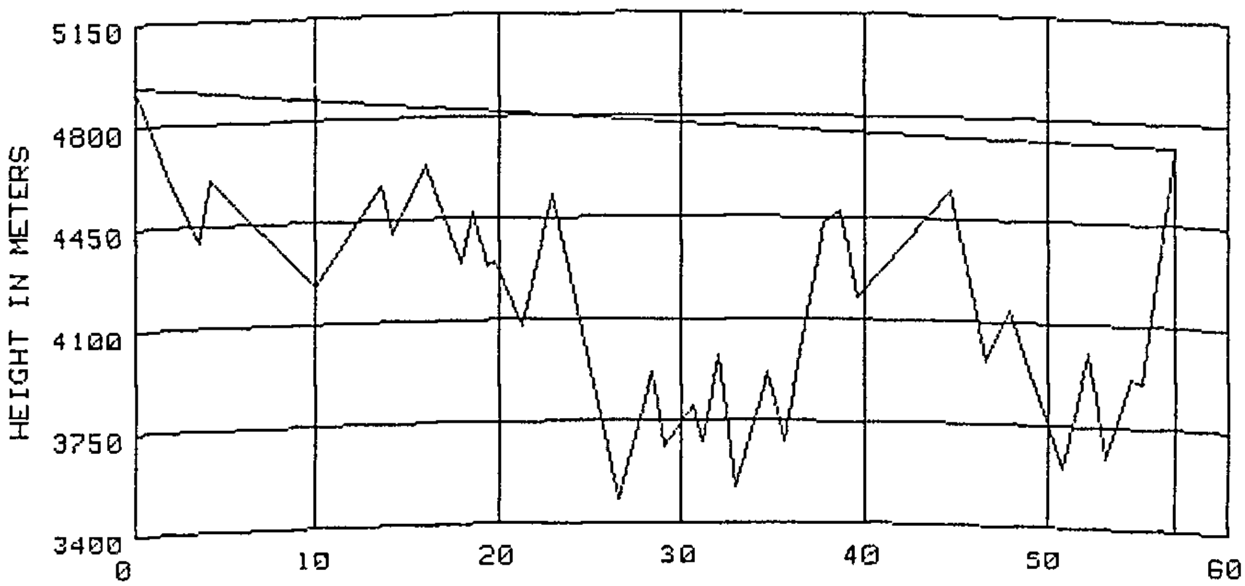


DISTANCE : 7.7 km

SITE 1 : POTOSI		SITE 2 : ORCOLLO	
GROUND ELEVATION:	3940.0 m	GROUND ELEVATION:	4920.0 m
ANTENNA HEIGHT:	25.0 m	ANTENNA HEIGHT:	30.0 m

```
######################################################################
#                                                                    #
#                  PATH CLEARANCE AND RIDGE LOSS                     #
#                                                                    #
#                                                                    #
#       K     =    1.33                                              #
#                                                                    #
#       F     =  6770 MHz :  (λ =    44 mm)                          #
#                                                                    #
#       Hg1   = 3940.0  m      Hg2   = 4920.0  m                     #
#       Ha1   =   25.0  m      Ha2   =   30.0  m                     #
#                                                                    #
#       D1    =    3.4 km      D2    =    4.3 km    Hm = 4390.0 m    #
#       U     =    0.99        Ld    =    0.0 dB                     #
#                                                                    #
#                                                                    #
#       Lfs   = 126.8 dB       Lfs + Ld   = 126.8 dB                 #
#                                                                    #
#                                                                    #
######################################################################
```

PATH PROFILE (4/3 RADIUS)



DISTANCE : 57.0 km

SITE 1 : ORCOLLO

GROUND ELEVATION: 4920.0 m

ANTENNA HEIGHT: 10.0 m

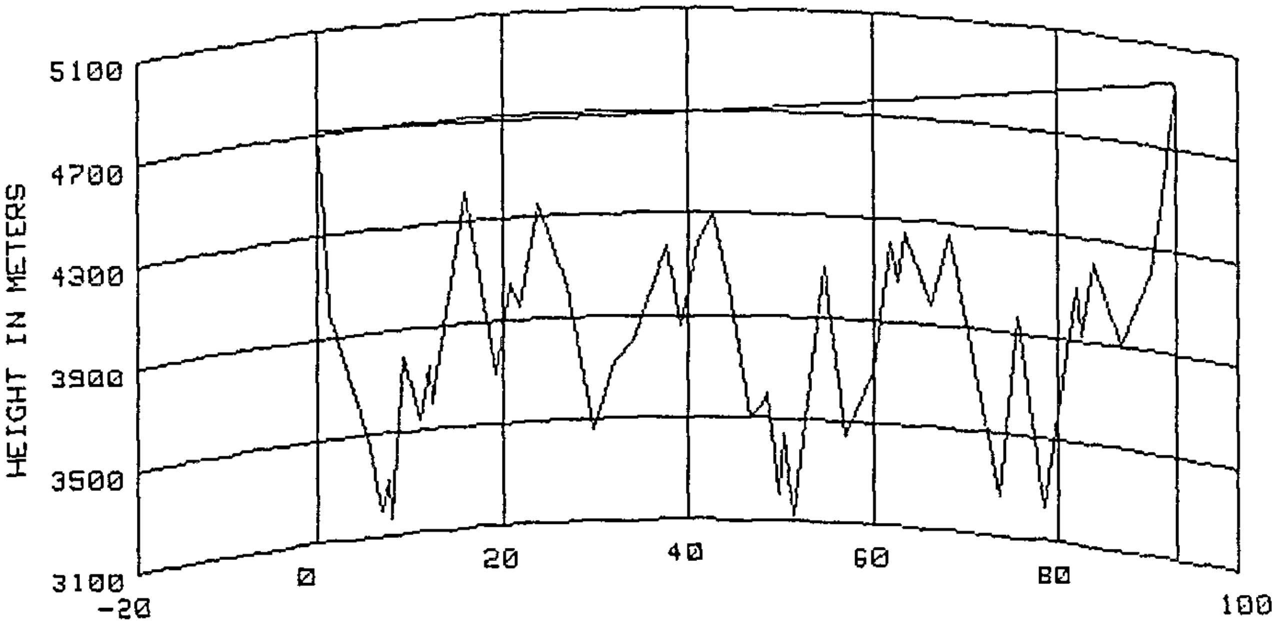
SITE 2 : Cerro SANO

GROUND ELEVATION: 4708.0 m

ANTENNA HEIGHT: 10.0 m

```
#####################################################################
#                                                                   #
#                  PATH CLEARANCE AND RIDGE LOSS                    #
#                                                                   #
#                                                                   #
#       K     =     1.33                                            #
#                                                                   #
#       F     =  6770 MHz :  (λ =    44 mm)                         #
#                                                                   #
#       Hg1   = 4920.0  m       Hg2  = 4708.0  m                    #
#       Ha1   =   10.0  m       Ha2  =   10.0  m                    #
#                                                                   #
#       D1    =   44.8 km       D2   =   12.2 km   Hm = 4550.0 m    #
#       U     =    8.79         Ld   =    0.0 dB                    #
#                                                                   #
#                                                                   #
#       Lfs   = 144.2 dB        Lfs + Ld  = 144.2 dB                #
#                                                                   #
#                                                                   #
#####################################################################
```

PATH PROFILE (4/3 RADIUS)

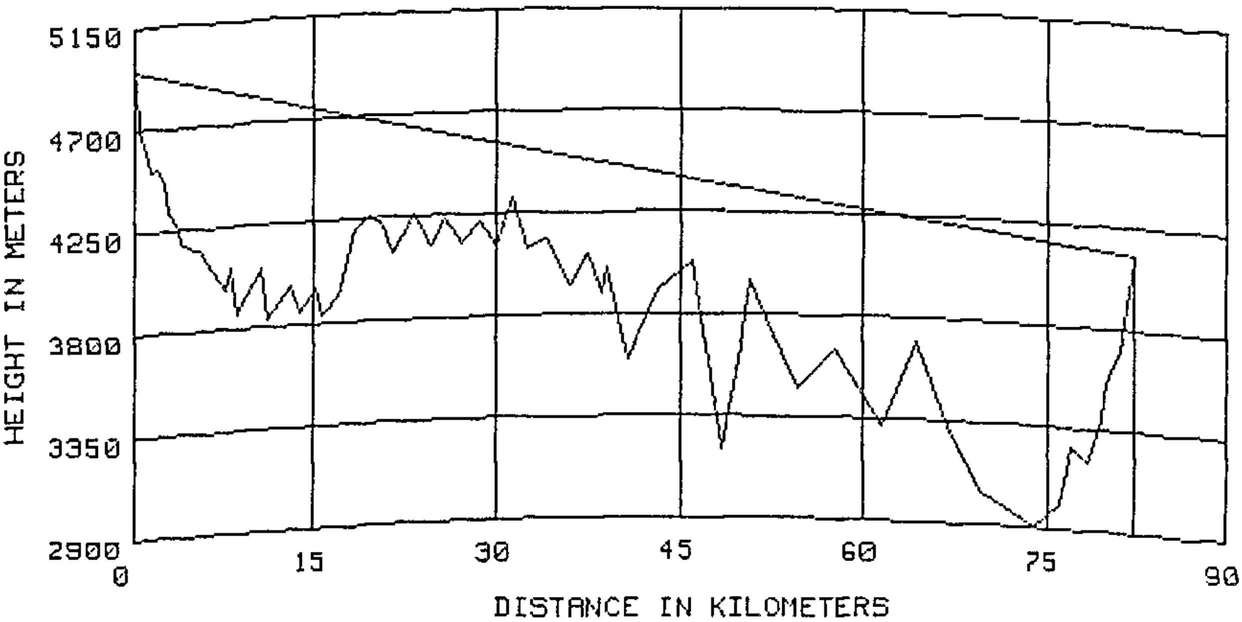


DISTANCE : 93.1 km

SITE 1 : Cerro SANO		SITE 2 : Cerro REFORMA	
GROUND ELEVATION:	4708.0 m	GROUND ELEVATION:	4940.0 m
ANTENNA HEIGHT:	10.0 m	ANTENNA HEIGHT:	10.0 m

```
#####################################################################
#                                                                   #
#                  PATH CLEARANCE AND RIDGE LOSS                    #
#                                                                   #
#                                                                   #
#       K     =    1.33                                             #
#                                                                   #
#       F     =  6770 MHz :  (λ =   44 mm)                          #
#                                                                   #
#       Hg1   = 4708.0  m       Hg2  = 4940.0  m                    #
#       Ha1   =   10.0  m       Ha2  =   10.0  m                    #
#                                                                   #
#       D1    =   92.7 km       D2   =    0.4 km   Hm = 4800.0 m    #
#       U     =   34.95         Ld   =    0.0 dB                    #
#                                                                   #
#                                                                   #
#       Lfs   = 148.4 dB        Lfs + Ld  = 148.4 dB                #
#                                                                   #
#                                                                   #
#####################################################################
```

PATH PROFILE (4/3 RADIUS)

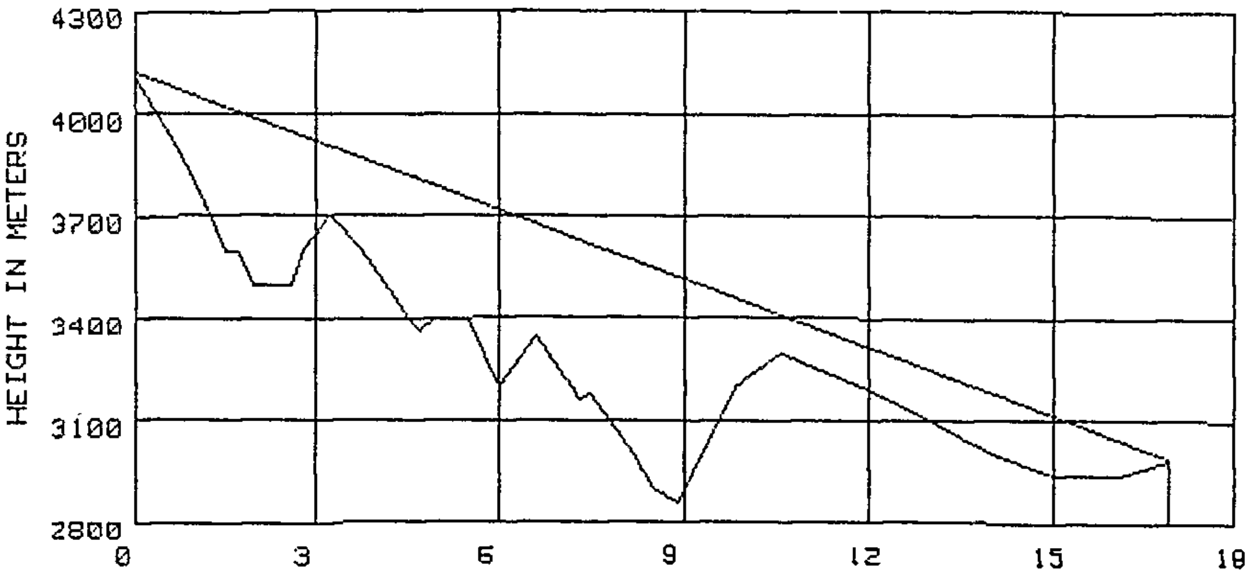


DISTANCE : 82.3 km

SITE 1 : Cerro REFORMA	SITE 2 : Cerro YUMIA
GROUND ELEVATION: 4940.0 m	GROUND ELEVATION: 4110.0 m
ANTENNA HEIGHT: 10.0 m	ANTENNA HEIGHT: 10.0 m

```
##################################################################
#                                                                #
#                 PATH CLEARANCE AND RIDGE LOSS                  #
#                                                                #
#                                                                #
#       K     =     1.33                                         #
#                                                                #
#       F     =  6770 MHz :  (λ =    44 mm)                      #
#                                                                #
#       Hg1   = 4940.0   m       Hg2   = 4110.0   m              #
#       Ha1   =   10.0   m       Ha2   =   10.0   m              #
#                                                                #
#       D1    =   81.7 km        D2    =    0.6 km   Hm = 3910.0 m  #
#       U     =   41.49          Ld    =    0.0 dB               #
#                                                                #
#                                                                #
#       Lfs   = 147.4 dB         Lfs + Ld  = 147.4 dB            #
#                                                                #
#                                                                #
##################################################################
```

PATH PROFILE (4/3 RADIUS)

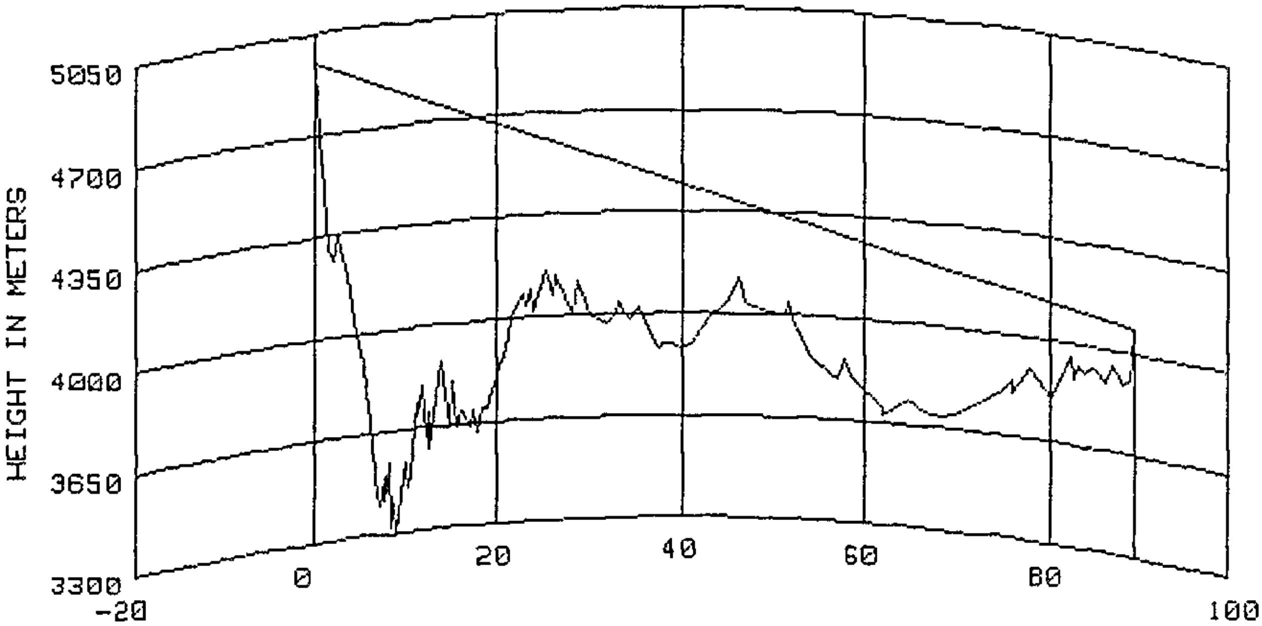


DISTANCE : 16.9 km

SITE 1 : Cerro YUMIA	SITE 2 : TUPIZA
GROUND ELEVATION: 4110.0 m	GROUND ELEVATION: 2980.0 m
ANTENNA HEIGHT: 10.0 m	ANTENNA HEIGHT: 10.0 m

```
######################################################################
#                                                                    #
#                 PATH CLEARANCE AND RIDGE LOSS                      #
#                                                                    #
#                                                                    #
#       K     =    1.33                                              #
#                                                                    #
#       F     =  6770 MHz :  (λ =    44 mm)                          #
#                                                                    #
#       Hg1   = 4110.0  m      Hg2  = 2980.0  m                      #
#       Ha1   =   10.0  m      Ha2  =   10.0  m                      #
#                                                                    #
#       D1    =   16.1 km      D2   =    0.8 km   Hm = 2960.0 m      #
#       U     =   14.24        Ld   =    0.0 dB                      #
#                                                                    #
#                                                                    #
#       Lfs   = 133.6 dB       Lfs + Ld  = 133.6 dB                  #
#                                                                    #
#                                                                    #
######################################################################
```

PATH PROFILE (4/3 RADIUS)

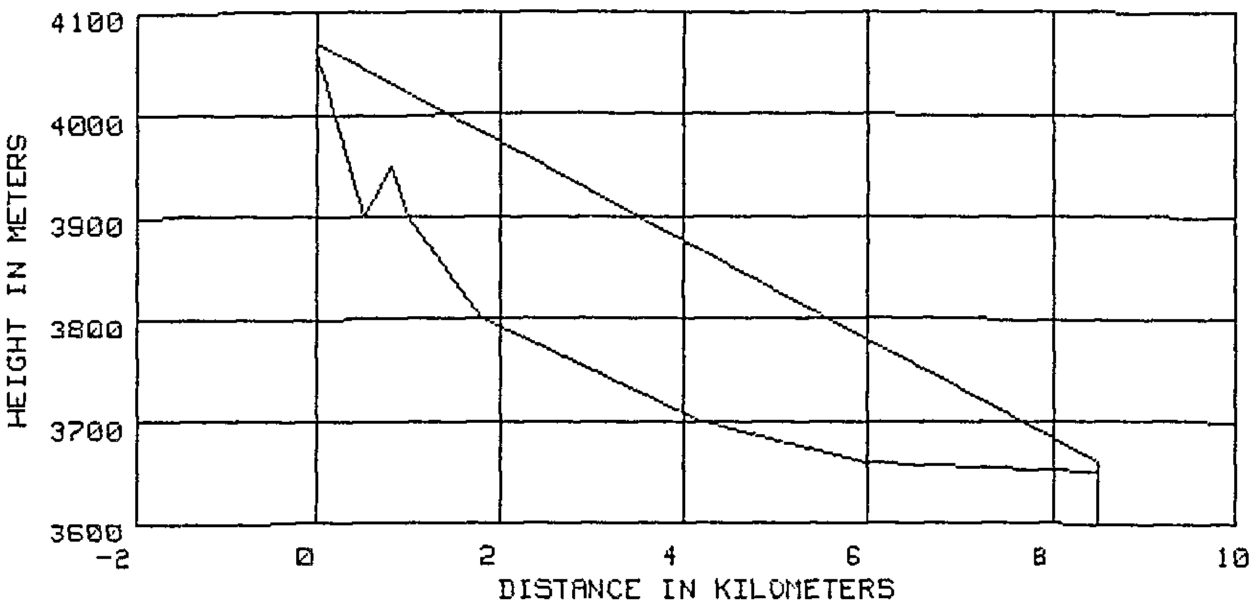


DISTANCE : 89.7 km

SITE 1 : Cerro REFORMA	SITE 2 : Rep.UYUNI
GROUND ELEVATION: 4940.0 m	GROUND ELEVATION: 4060.0 m
ANTENNA HEIGHT: 10.0 m	ANTENNA HEIGHT: 10.0 m

```
#################################################################
#                                                               #
#                PATH CLEARANCE AND RIDGE LOSS                  #
#                                                               #
#                                                               #
#       K     =    1.33                                         #
#                                                               #
#       F     =   900 MHz :  (λ =  333 mm)                      #
#                                                               #
#       Hg1   = 4940.0  m       Hg2  = 4060.0  m                #
#       Ha1   =   10.0  m       Ha2  =   10.0  m                #
#                                                               #
#       D1    =   87.0 km       D2   =    2.7 km   Hm = 3950.0 m  #
#       U     =    4.49         Ld   =    0.0 dB                #
#                                                               #
#                                                               #
#       Lfs   = 130.6 dB        Lfs + Ld  = 130.6 dB            #
#                                                               #
#                                                               #
#################################################################
```

PATH PROFILE (4/3 RADIUS)



DISTANCE : 8.5 km

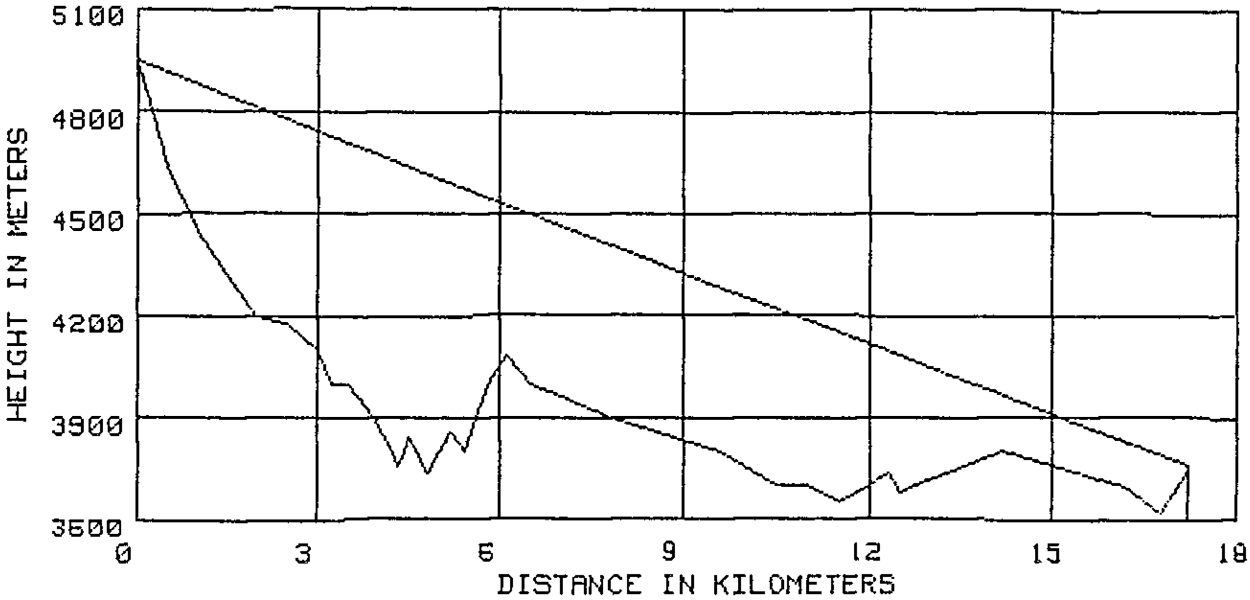
SITE 1 : Rep.UYUNI | SITE 2 : UYUNI

GROUND ELEVATION: 4060.0 m | GROUND ELEVATION: 3650.0 m

ANTENNA HEIGHT: 10.0 m | ANTENNA HEIGHT: 10.0 m

```
######################################################################
#                                                                    #
#                   PATH CLEARANCE AND RIDGE LOSS                    #
#                                                                    #
#                                                                    #
#       K     =     1.33                                             #
#                                                                    #
#       F     =    900 MHz :  (λ =  333 mm)                          #
#                                                                    #
#       Hg1   = 4060.0  m       Hg2  = 3650.0  m                     #
#       Ha1   =   10.0  m       Ha2  =   10.0  m                     #
#                                                                    #
#       D1    =     8.0 km      D2   =     0.5 km   Hm = 3670.0 m    #
#       U     =     1.11        Ld   =     0.0 dB                    #
#                                                                    #
#                                                                    #
#       Lfs   = 110.1 dB        Lfs + Ld  = 110.1 dB                 #
#                                                                    #
#                                                                    #
######################################################################
```

PATH PROFILE (4/3 RADIUS)

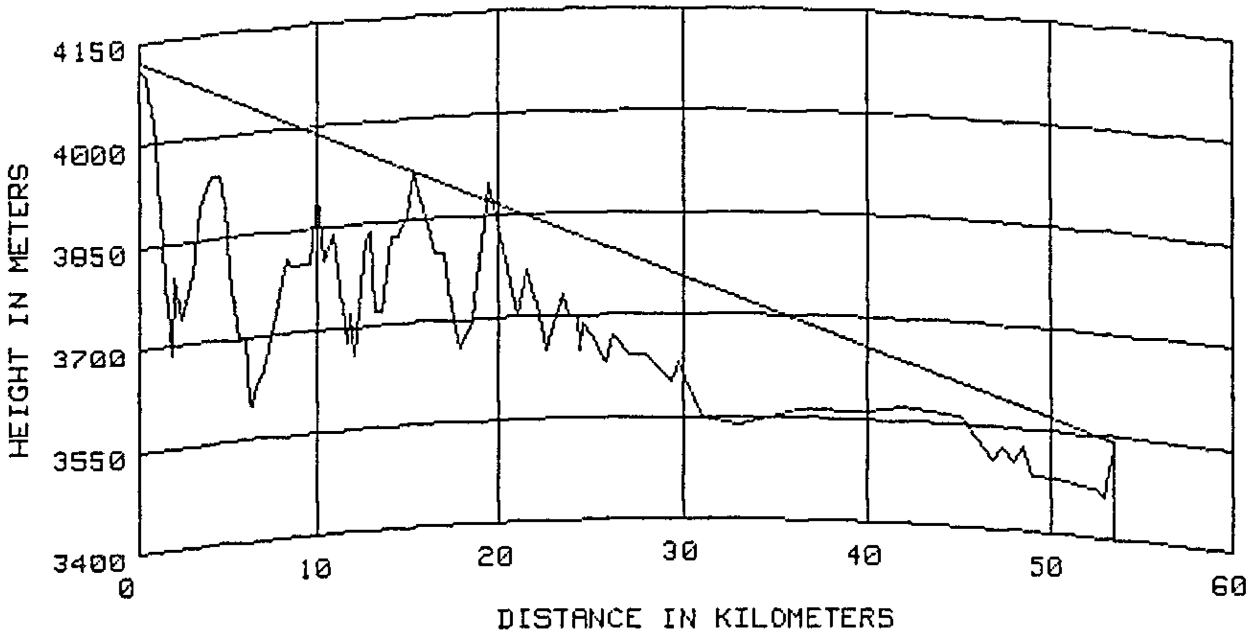


DISTANCE : 17.2 km

SITE 1 : Cerro REFORMA	SITE 2 : ATOCHA
GROUND ELEVATION: 4940.0 m	GROUND ELEVATION: 3750.0 m
ANTENNA HEIGHT: 10.0 m	ANTENNA HEIGHT: 10.0 m

```
#################################################################
#                                                               #
#                 PATH CLEARANCE AND RIDGE LOSS                 #
#                                                               #
#                                                               #
#      K     =     1.33                                         #
#                                                               #
#      F     =   900 MHz :  (λ =  333 mm)                       #
#                                                               #
#      Hg1   = 4940.0  m      Hg2  = 3750.0  m                  #
#      Ha1   =   10.0  m      Ha2  =   10.0  m                  #
#                                                               #
#      D1    =   16.2 km      D2   =    1.0 km   Hm = 3710.0 m  #
#      U     =    6.67        Ld   =    0.0 dB                  #
#                                                               #
#                                                               #
#      Lfs   = 116.3 dB       Lfs + Ld  = 116.3 dB              #
#                                                               #
#                                                               #
#################################################################
```

PATH PROFILE (4/3 RADIUS)

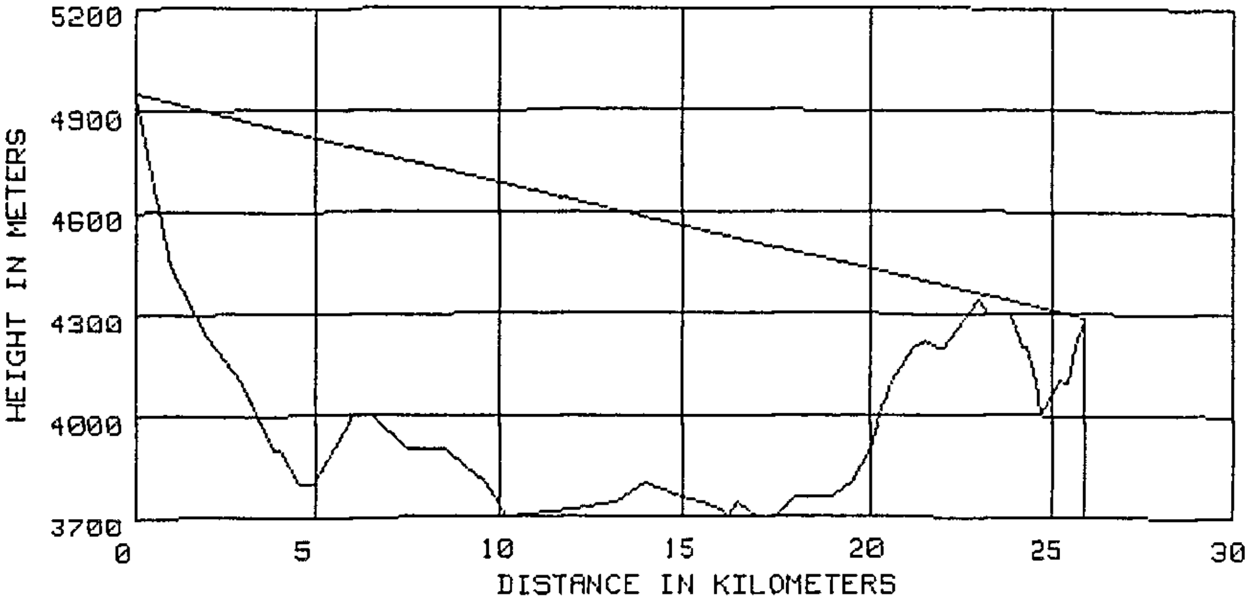


DISTANCE : 53.5 km

SITE 1 : Cerro YUMIA	SITE 2 : VILLAZON
GROUND ELEVATION: 4110.0 m	GROUND ELEVATION: 3530.0 m
ANTENNA HEIGHT: 10.0 m	ANTENNA HEIGHT: 10.0 m

```
####################################################################
#                                                                  #
#                 PATH CLEARANCE AND RIDGE LOSS                    #
#                                                                  #
#                                                                  #
#       K     =    1.33                                            #
#                                                                  #
#       F     =   900 MHz :  (λ =  333 mm)                         #
#                                                                  #
#       Hg1   = 4110.0  m       Hg2  = 3530.0  m                   #
#       Ha1   =   10.0  m       Ha2  =   10.0  m                   #
#                                                                  #
#       D1    =   19.5 km       D2   =   34.0 km   Hm = 3910.0 m   #
#       U     =    -.63         Ld   =   13.1 dB                   #
#                                                                  #
#                                                                  #
#       Lfs   = 126.1 dB        Lfs + Ld  = 139.2 dB               #
#                                                                  #
#                                                                  #
####################################################################
```

PATH PROFILE (4/3 RADIUS)

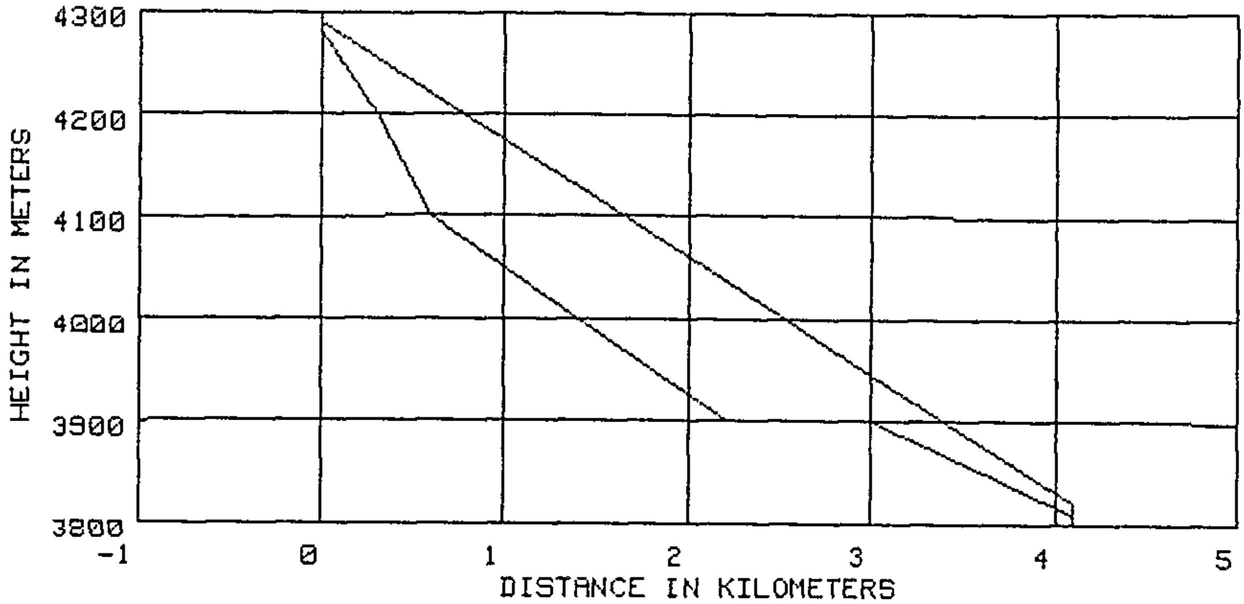


DISTANCE : 25.9 km

SITE 1 : Cerro REFORMA		SITE 2 : AGUADE CASTILLA	
GROUND ELEVATION:	4940.0 m	GROUND ELEVATION:	4280.0 m
ANTENNA HEIGHT:	10.0 m	ANTENNA HEIGHT:	10.0 m

```
#################################################################
#                                                               #
#                PATH CLEARANCE AND RIDGE LOSS                  #
#                                                               #
#                                                               #
#      K     =    1.33                                          #
#                                                               #
#      F     =   160 MHz :  (λ = 1875 mm)                       #
#                                                               #
#      Hg1   = 4940.0  m      Hg2  = 4280.0  m                  #
#      Ha1   =   10.0  m      Ha2  =   10.0  m                  #
#                                                               #
#      D1    =   23.0 km      D2   =    2.9 km   Hm = 4340.0 m  #
#      U     =    0.29        Ld   =    2.6 dB                  #
#                                                               #
#                                                               #
#      Lfs   = 104.8 dB       Lfs + Ld  = 107.4 dB              #
#                                                               #
#                                                               #
#################################################################
```

PATH PROFILE (4/3 RADIUS)

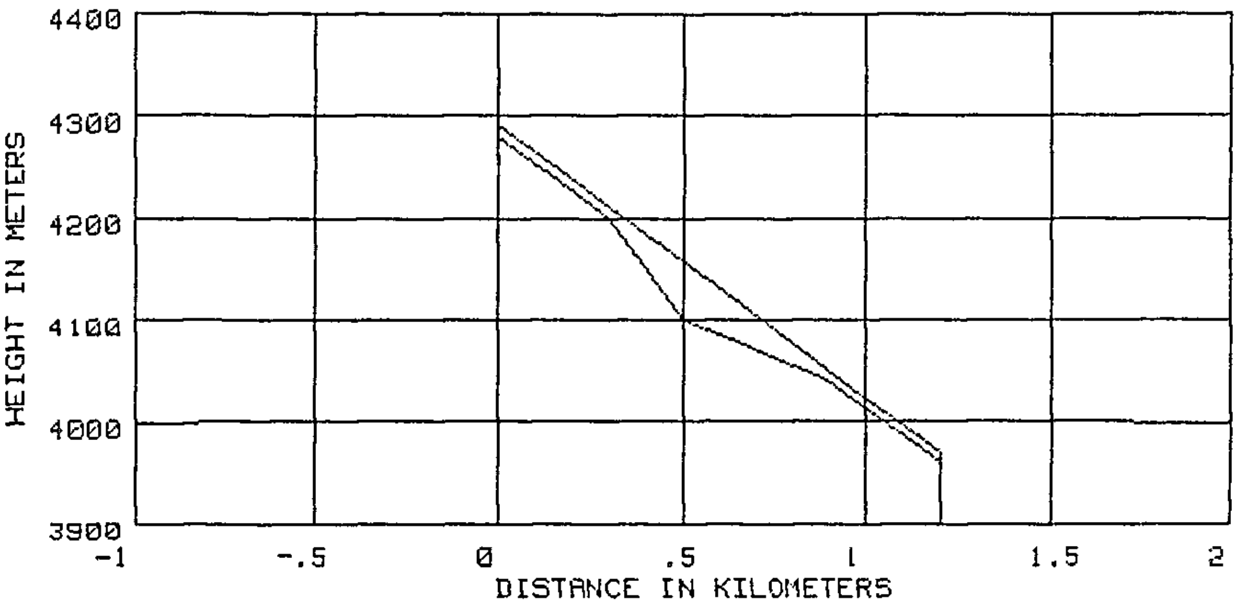


DISTANCE : 4.1 km

SITE 1 : AGUADE CASTILLA	SITE 2 : SANTA ANA
GROUND ELEVATION: 4280.0 m	GROUND ELEVATION: 3810.0 m
ANTENNA HEIGHT: 10.0 m	ANTENNA HEIGHT: 10.0 m

```
##################################################################
#                                                                #
#                PATH CLEARANCE AND RIDGE LOSS                   #
#                                                                #
#                                                                #
#      K     =    1.33                                           #
#                                                                #
#      F     =   160 MHz :  (λ = 1875 mm)                        #
#                                                                #
#      Hg1   = 4280.0  m       Hg2  = 3810.0  m                  #
#      Ha1   =   10.0  m       Ha2  =   10.0  m                  #
#                                                                #
#      D1    =    3.0 km       D2   =    1.1 km   Hm = 3910.0 m  #
#      U     =    0.92         Ld   =    0.0 dB                  #
#                                                                #
#                                                                #
#      Lfs   =  88.8 dB        Lfs + Ld  =  88.8 dB              #
#                                                                #
#                                                                #
##################################################################
```

PATH PROFILE (4/3 RADIUS)



DISTANCE : 1.2 km

SITE 1 : AGUA DE CASTILLA

GROUND ELEVATION: 4280.0 m

ANTENNA HEIGHT: 10.0 m

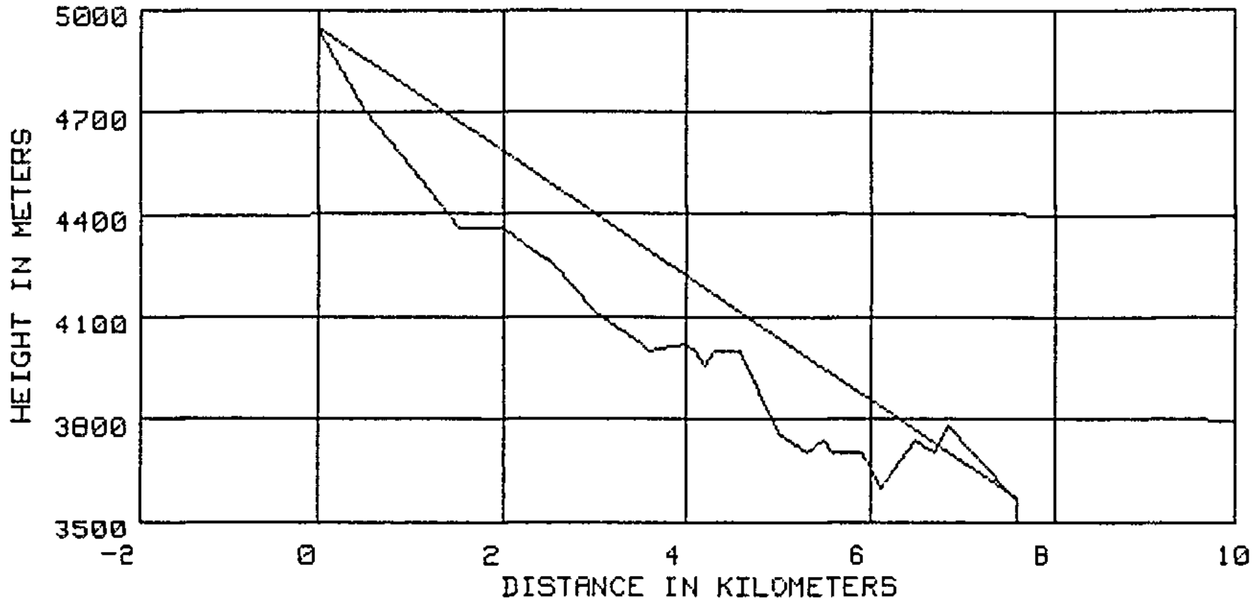
SITE 2 : SIETE SUYOS

GROUND ELEVATION: 3960.0 m

ANTENNA HEIGHT: 10.0 m

```
###################################################################
#                                                                 #
#                  PATH CLEARANCE AND RIDGE LOSS                  #
#                                                                 #
#                                                                 #
#       K     =     1.33                                          #
#                                                                 #
#       F     =    160 MHz :  (λ = 1875 mm)                       #
#                                                                 #
#       Hg1   = 4280.0  m       Hg2   = 3960.0  m                 #
#       Ha1   =   10.0  m       Ha2   =   10.0  m                 #
#                                                                 #
#       D1    =     0.3 km      D2    =     0.9 km   Hm = 4200.0 m #
#       U     =     0.49        Ld    =     0.0 dB                #
#                                                                 #
#                                                                 #
#       Lfs   =   78.1 dB       Lfs + Ld   =   78.1 dB            #
#                                                                 #
#                                                                 #
###################################################################
```

PATH PROFILE (4/3 RADIUS)



DISTANCE : 7.6 km

SITE 1 : Cerro REFORMA

GROUND ELEVATION: 4940.0 m

ANTENNA HEIGHT: 10.0 m

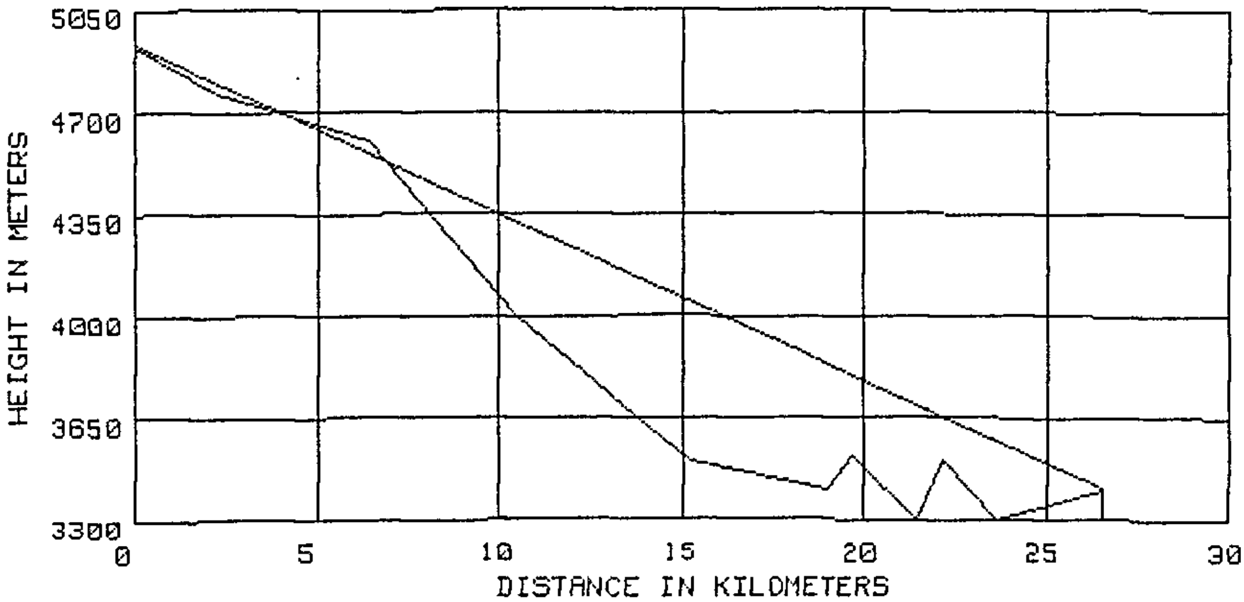
SITE 2 : QUECHISLA

GROUND ELEVATION: 3560.0 m

ANTENNA HEIGHT: 10.0 m

```
##################################################################
#                                                                #
#                  PATH CLEARANCE AND RIDGE LOSS                 #
#                                                                #
#                                                                #
#       K     =     1.33                                         #
#                                                                #
#       F     =   160 MHz :  (λ = 1875 mm)                       #
#                                                                #
#       Hg1   = 4940.0  m      Hg2  = 3560.0  m                  #
#       Ha1   =   10.0  m      Ha2  =   10.0  m                  #
#                                                                #
#       D1    =    6.9 km      D2   =    0.8 km   Hm = 3790.0 m  #
#       U     =   -2.36        Ld   =   23.5 dB                  #
#                                                                #
#                                                                #
#       Lfs   =  94.2 dB       Lfs + Ld  = 117.6 dB              #
#                                                                #
#                                                                #
##################################################################
```

PATH PROFILE (4/3 RADIUS)



DISTANCE : 26.5 km

SITE 1 : ORCOLLO

GROUND ELEVATION: 4920.0 m

ANTENNA HEIGHT: 10.0 m

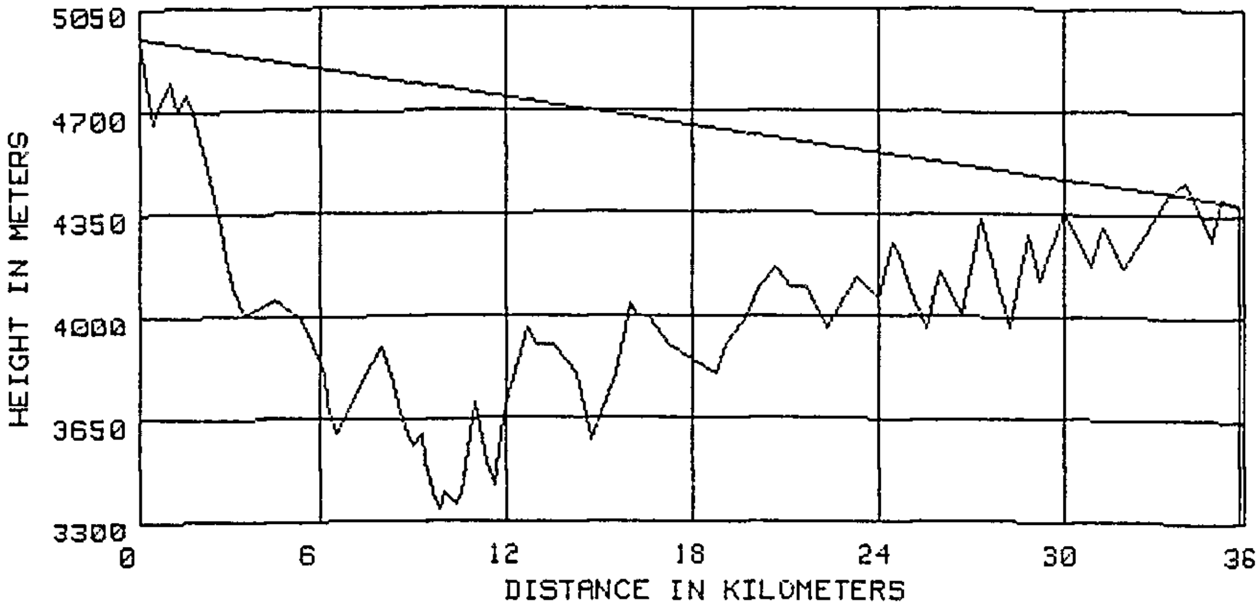
SITE 2 : BETANZOS

GROUND ELEVATION: 3400.0 m

ANTENNA HEIGHT: 10.0 m

```
##################################################################
#                                                                #
#                 PATH CLEARANCE AND RIDGE LOSS                  #
#                                                                #
#                                                                #
#       K     =     1.33                                         #
#                                                                #
#       F     =   160 MHz :  (λ = 1875 mm)                       #
#                                                                #
#       Hg1   = 4920.0  m       Hg2   = 3400.0  m                #
#       Ha1   =   10.0  m       Ha2   =   10.0  m                #
#                                                                #
#       D1    =    6.4 km       D2    =   20.1 km   Hm = 4600.0 m #
#       U     =    -.47         Ld    =   11.5 dB                #
#                                                                #
#                                                                #
#       Lfs   = 105.0 dB        Lfs + Ld  = 116.5 dB             #
#                                                                #
#                                                                #
##################################################################
```

PATH PROFILE (4/3 RADIUS)



DISTANCE : 35.8 km

SITE 1 : Cerro REFORMA

GROUND ELEVATION: 4940.0 m

ANTENNA HEIGHT: 10.0 m

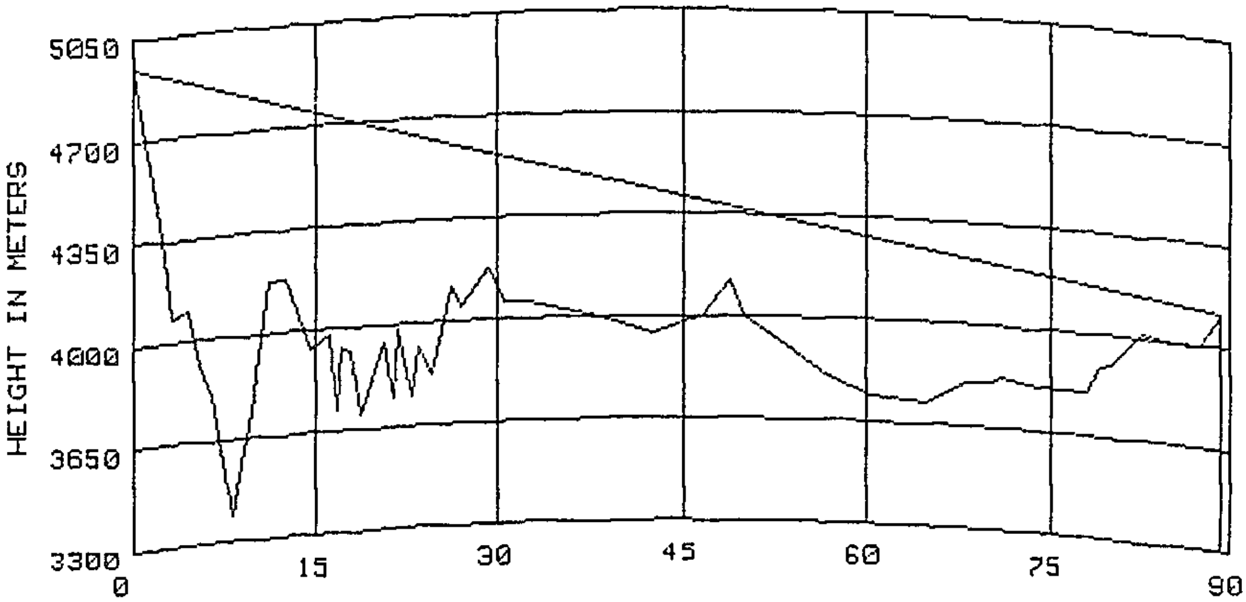
SITE 2 : TAZNA

GROUND ELEVATION: 4380.0 m

ANTENNA HEIGHT: 10.0 m

```
################################################################
#                                                              #
#                PATH CLEARANCE AND RIDGE LOSS                 #
#                                                              #
#                                                              #
#       K    =    1.33                                         #
#                                                              #
#       F    =   160 MHz :  (λ = 1875 mm)                      #
#                                                              #
#       Hg1  = 4940.0  m      Hg2  = 4380.0  m                 #
#       Ha1  =   10.0  m      Ha2  =   10.0  m                 #
#                                                              #
#       D1   =   34.0 km      D2   =    1.8 km   Hm = 4460.0 m #
#       U    =    -.80        Ld   =   14.7 dB                 #
#                                                              #
#                                                              #
#       Lfs  = 107.6 dB       Lfs + Ld  = 122.3 dB             #
#                                                              #
#                                                              #
################################################################
```

PATH PROFILE (4/3 RADIUS)



DISTANCE : 89.1 km

SITE 1 : Cerro REFORMA		SITE 2 : PULACAYO	
GROUND ELEVATION:	4940.0 m	GROUND ELEVATION:	4100.0 m
ANTENNA HEIGHT:	10.0 m	ANTENNA HEIGHT:	10.0 m

PATH CLEARANCE AND RIDGE LOSS

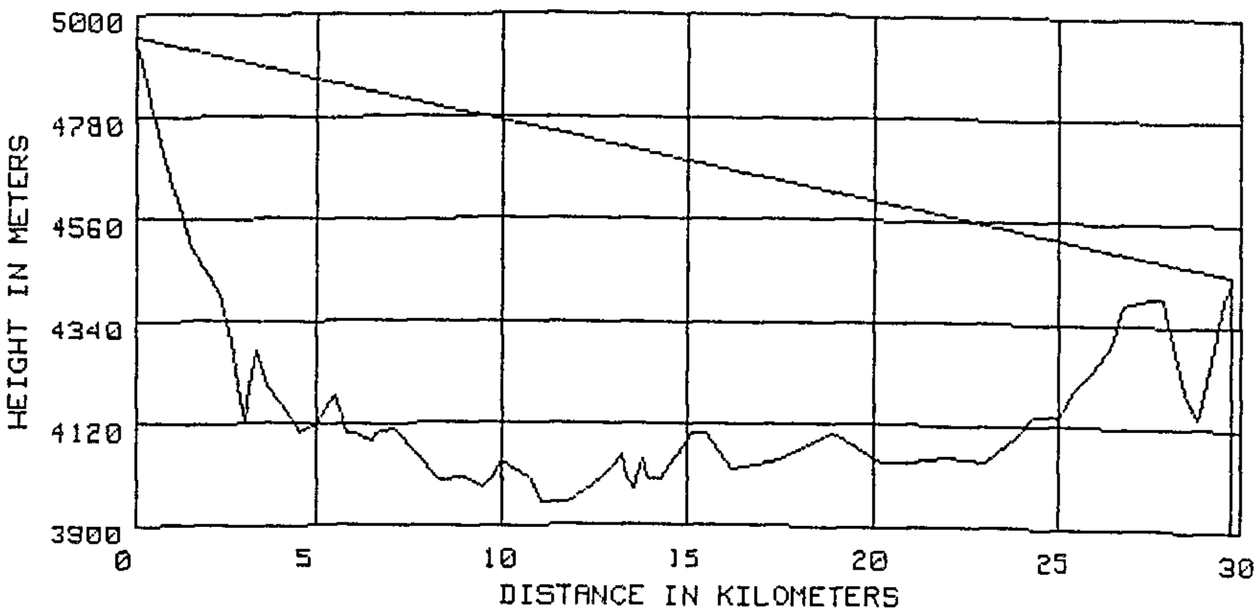
K = 1.33

F = 160 MHz : (λ = 1875 mm)

Hg1	= 4940.0 m	Hg2	= 4100.0 m		
Ha1	= 10.0 m	Ha2	= 10.0 m		
D1	= 87.5 km	D2	= 1.6 km	Hm	= 4000.0 m
U	= 2.15	Ld	= 0.0 dB		

Lfs = 115.5 dB   Lfs + Ld = 115.5 dB

PATH PROFILE (4/3 RADIUS)

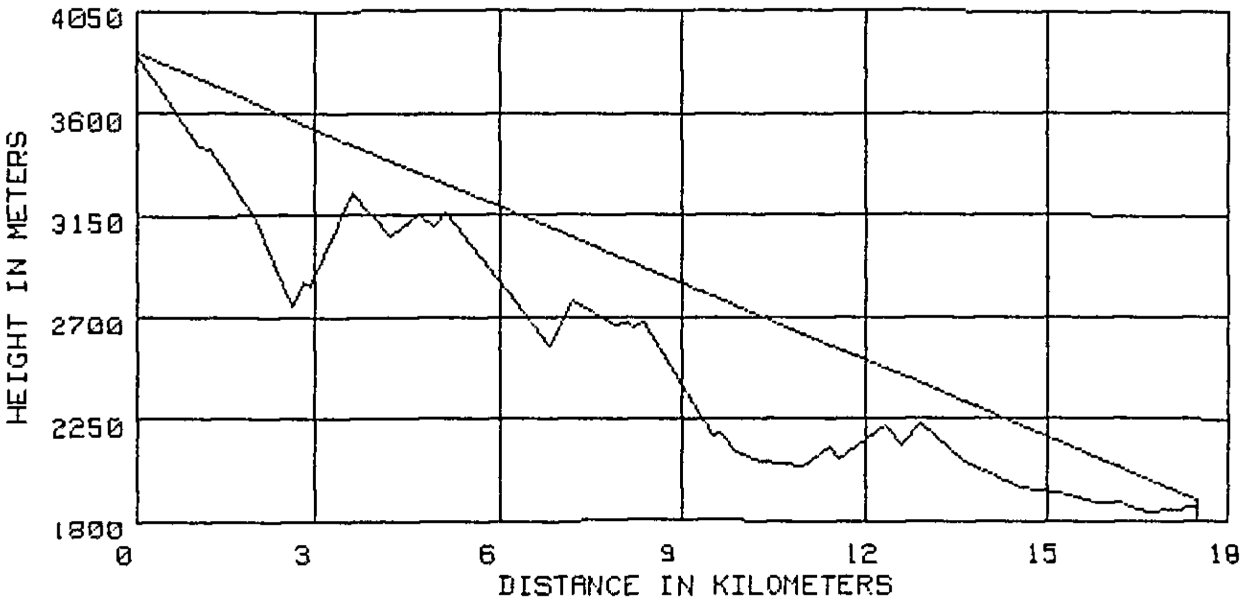


DISTANCE : 29.7 km

SITE 1 : Cerro REFORMA	SITE 2 : TATASI
GROUND ELEVATION: 4940.0 m	GROUND ELEVATION: 4440.0 m
ANTENNA HEIGHT: 10.0 m	ANTENNA HEIGHT: 10.0 m

```
#####################################################################
#                                                                   #
#                 PATH CLEARANCE AND RIDGE LOSS                     #
#                                                                   #
#                                                                   #
#      K     =     1.33                                             #
#                                                                   #
#      F     =    160 MHz :  (λ = 1875 mm)                          #
#                                                                   #
#      Hg1   = 4940.0  m       Hg2   = 4440.0  m                    #
#      Ha1   =   10.0  m       Ha2   =   10.0  m                    #
#                                                                   #
#      D1    =    29.5 km      D2    =     0.2 km    Hm = 4400.0 m  #
#      U     =     2.75        Ld    =     0.0 dB                   #
#                                                                   #
#                                                                   #
#      Lfs   = 106.0 dB        Lfs + Ld   = 106.0 dB                #
#                                                                   #
#                                                                   #
#####################################################################
```

PATH PROFILE (4/3 RADIUS)

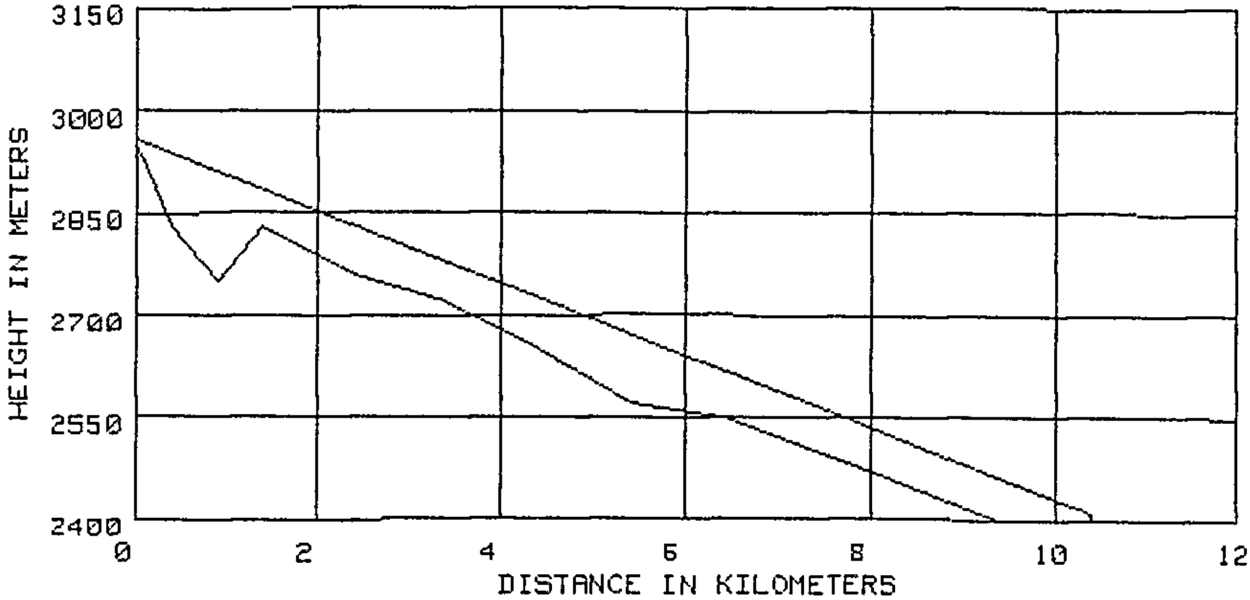


DISTANCE : 17.5 km

SITE 1 :	SAMA	SITE 2 :	TARIJA
GROUND ELEVATION:	3860.0 m	GROUND ELEVATION:	1860.0 m
ANTENNA HEIGHT:	10.0 m	ANTENNA HEIGHT:	30.0 m

```
#################################################################
#                                                               #
#                 PATH CLEARANCE AND RIDGE LOSS                 #
#                                                               #
#                                                               #
#       K     =    1.33                                         #
#                                                               #
#       F     =  7275 MHz :  (λ =    41 mm)                     #
#                                                               #
#       Hg1   = 3860.0   m      Hg2   = 1860.0   m              #
#       Ha1   =   10.0   m      Ha2   =   30.0   m              #
#                                                               #
#       D1    =   16.7 km       D2    =     0.8 km   Hm = 1860.0 m  #
#       U     =   21.34         Ld    =     0.0 dB              #
#                                                               #
#                                                               #
#       Lfs   = 134.6 dB        Lfs + Ld   = 134.6 dB           #
#                                                               #
#                                                               #
#################################################################
```

PATH PROFILE (4/3 RADIUS)

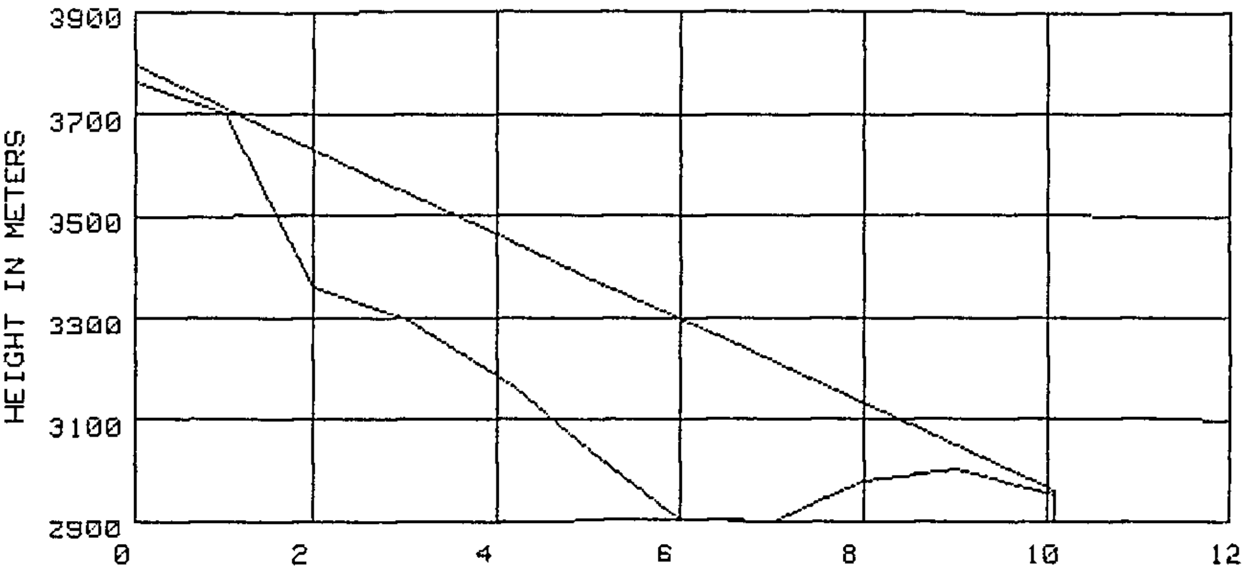


DISTANCE : 10.4 km

SITE 1 : BALCON	SITE 2 : CAMARGO
GROUND ELEVATION: 2950.0 m	GROUND ELEVATION: 2400.0 m
ANTENNA HEIGHT: 10.0 m	ANTENNA HEIGHT: 10.0 m

```
######################################################################
#                                                                    #
#                 PATH CLEARANCE AND RIDGE LOSS                      #
#                                                                    #
#                                                                    #
#       K     =    1.33                                              #
#                                                                    #
#       F     =   900 MHz :  (λ =  333 mm)                           #
#                                                                    #
#       Hg1   = 2950.0  m       Hg2  = 2400.0  m                     #
#       Ha1   =   10.0  m       Ha2  =   10.0  m                     #
#                                                                    #
#       D1    =    9.4 km       D2   =     1.0 km   Hm = 2420.0 m    #
#       U     =    2.44         Ld   =     0.0 dB                    #
#                                                                    #
#                                                                    #
#       Lfs   = 111.9 dB        Lfs + Ld  = 111.9 dB                 #
#                                                                    #
#                                                                    #
######################################################################
```

PATH PROFILE (4/3 RADIUS)



DISTANCE : 10.1 km

SITE 1 : Rep.PELILLOJO	SITE 2 : BALCON
GROUND ELEVATION: 3760.0 m	GROUND ELEVATION: 2950.0 m
ANTENNA HEIGHT: 35.0 m	ANTENNA HEIGHT: 10.0 m

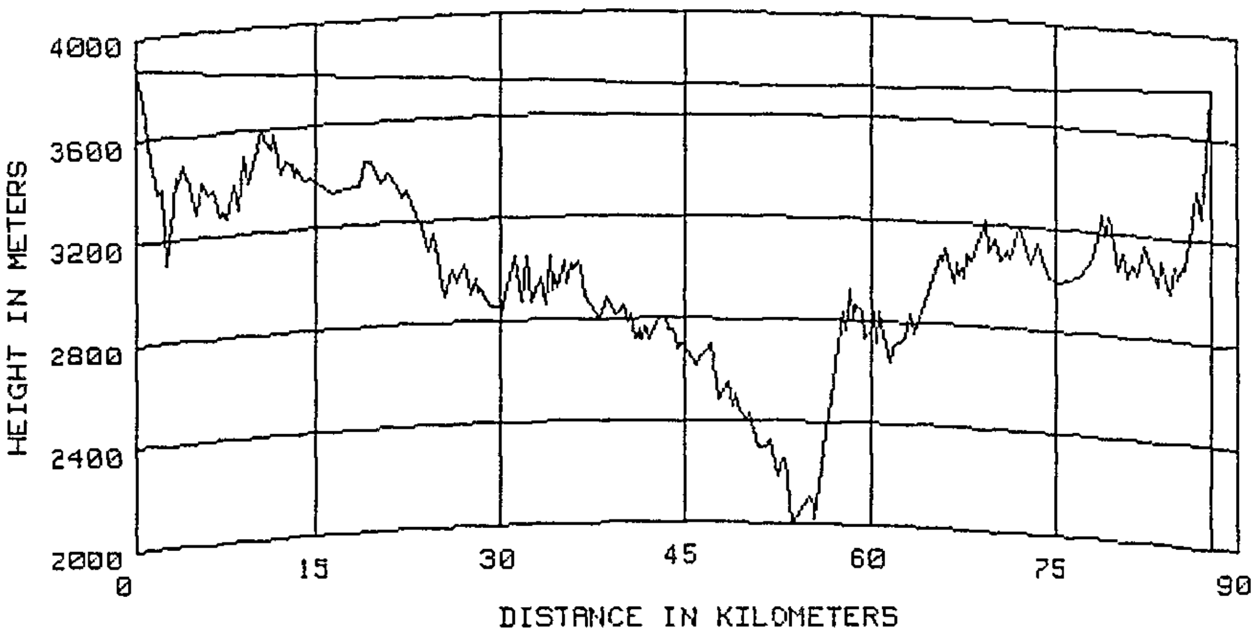
PATH CLEARANCE AND RIDGE LOSS

K = 1.33

F = 900 MHz : (λ = 333 mm)

Hg1 = 3760.0 m	Hg2 = 2950.0 m	
Ha1 = 35.0 m	Ha2 = 10.0 m	
D1 = 1.0 km	D2 = 9.1 km	Hm = 3710.0 m
U = 0.10	Ld = 4.8 dB	
Lfs = 111.6 dB	Lfs + Ld = 116.4 dB	

PATH PROFILE (4/3 RADIUS)

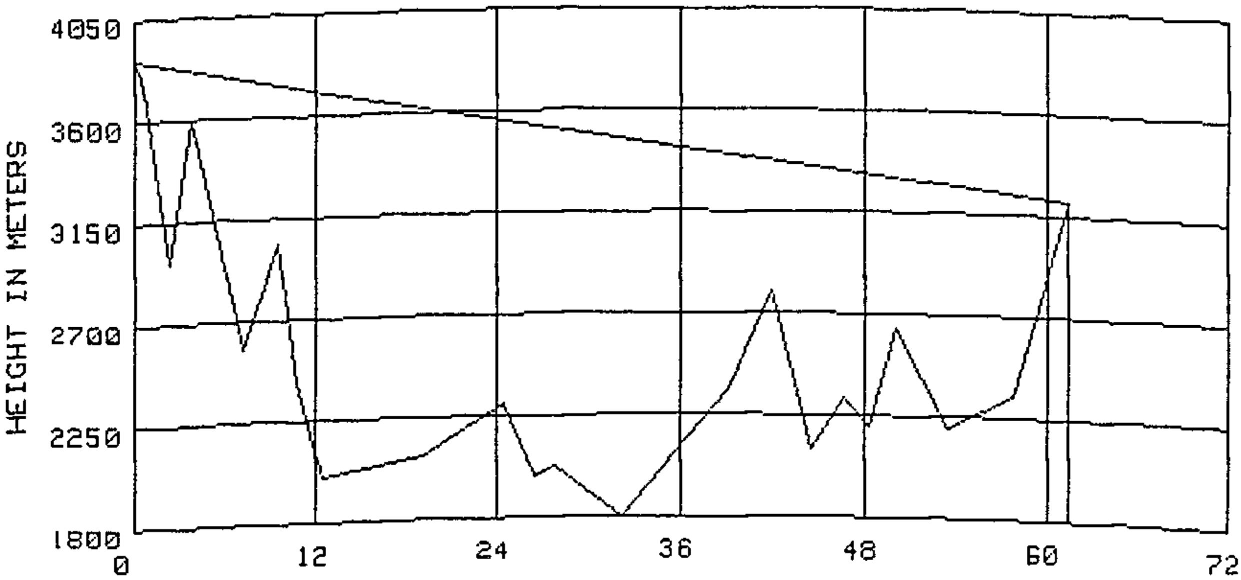


DISTANCE : 87.9 km

SITE 1 : SAMA	SITE 2 : Rep.PELILLOJO
GROUND ELEVATION: 3860.0 m	GROUND ELEVATION: 3780.0 m
ANTENNA HEIGHT: 10.0 m	ANTENNA HEIGHT: 10.0 m

```
#################################################################
#                                                               #
#                PATH CLEARANCE AND RIDGE LOSS                  #
#                                                               #
#                                                               #
#       K    =    1.33                                          #
#                                                               #
#       F    =   900 MHz :  (λ =  333 mm)                       #
#                                                               #
#       Hg1  = 3860.0  m      Hg2  = 3780.0  m                  #
#       Ha1  =   10.0  m      Ha2  =   10.0  m                  #
#                                                               #
#       D1   =   86.6 km      D2   =    1.3 km   Hm = 3390.0 m  #
#       U    =   19.10        Ld   =    0.0 dB                  #
#                                                               #
#                                                               #
#       Lfs  = 130.4 dB       Lfs + Ld  = 130.4 dB              #
#                                                               #
#                                                               #
#################################################################
```

PATH PROFILE (4/3 RADIUS)

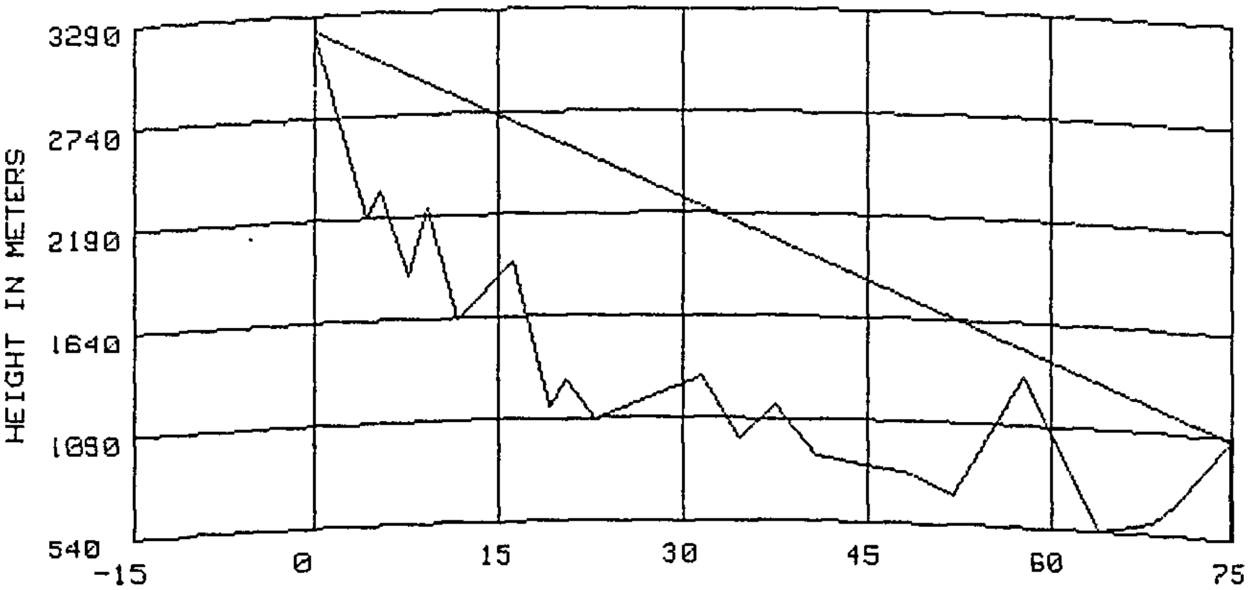


DISTANCE : 61.4 km

SITE 1 : SAMA	SITE 2 : C.ALTO GRANDE
GROUND ELEVATION: 3860.0 m	GROUND ELEVATION: 3200.0 m
ANTENNA HEIGHT: 10.0 m	ANTENNA HEIGHT: 10.0 m

```
##################################################################
#                                                                #
#                 PATH CLEARANCE AND RIDGE LOSS                  #
#                                                                #
#                                                                #
#     K     =    1.33                                            #
#                                                                #
#     F     =   900 MHz :  (λ =  333 mm)                         #
#                                                                #
#     Hg1   = 3860.0  m      Hg2  = 3200.0  m                    #
#     Ha1   =   10.0  m      Ha2  =   10.0  m                    #
#                                                                #
#     D1    =   50.1 km      D2   =   11.3 km   Hm = 2660.0 m    #
#     U     =   11.51        Ld   =    0.0 dB                    #
#                                                                #
#                                                                #
#     Lfs   = 127.3 dB       Lfs + Ld  = 127.3 dB                #
#                                                                #
#                                                                #
##################################################################
```

PATH PROFILE (4/3 RADIUS)

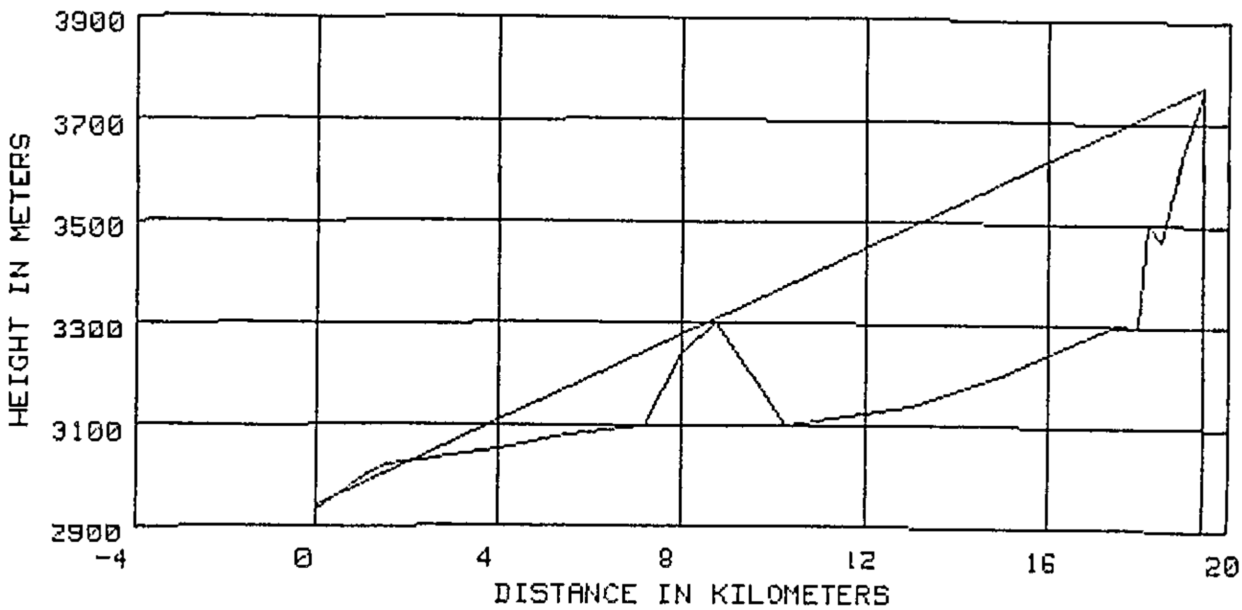


DISTANCE : 74.8 km

SITE 1 : C.ALTO GRANDE	SITE 2 : C.CANDADO GRANDE
GROUND ELEVATION: 3200.0 m	GROUND ELEVATION: 1050.0 m
ANTENNA HEIGHT: 10.0 m	ANTENNA HEIGHT: 10.0 m

```
#####################################################################
#                                                                   #
#                  PATH CLEARANCE AND RIDGE LOSS                    #
#                                                                   #
#                                                                   #
#       K     =    1.33                                             #
#                                                                   #
#       F     =   900 MHz :  (λ =  333 mm)                          #
#                                                                   #
#       Hg1   = 3200.0  m      Hg2   = 1050.0  m                    #
#       Ha1   =   10.0  m      Ha2   =   10.0  m                    #
#                                                                   #
#       D1    =   57.7 km      D2    =   17.1 km   Hm = 1360.0 m    #
#       U     =    2.01        Ld    =    0.0 dB                    #
#                                                                   #
#                                                                   #
#       Lfs   = 129.0 dB       Lfs + Ld  = 129.0 dB                 #
#                                                                   #
#                                                                   #
#####################################################################
```

PATH PROFILE (4/3 RADIUS)

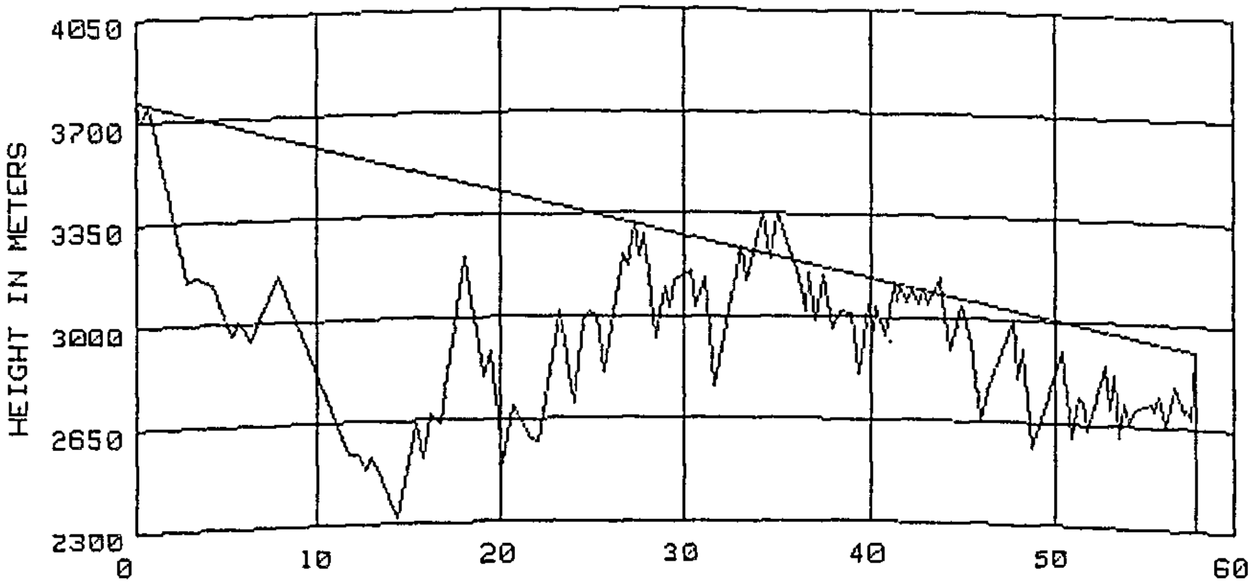


DISTANCE : 19.4 km

SITE 1 : CULPINA	SITE 2 : Rep.PELILLOJO
GROUND ELEVATION: 2930.0 m	GROUND ELEVATION: 3760.0 m
ANTENNA HEIGHT: 10.0 m	ANTENNA HEIGHT: 10.0 m

```
#######################################################################
#                                                                     #
#                PATH CLEARANCE AND RIDGE LOSS                        #
#                                                                     #
#                                                                     #
#      K     =     1.33                                               #
#                                                                     #
#      F     =   160 MHz :  (λ = 1875 mm)                             #
#                                                                     #
#      Hg1   = 2930.0  m        Hg2  = 3760.0  m                      #
#      Ha1   =   10.0  m        Ha2  =   10.0  m                      #
#                                                                     #
#      D1    =     8.7 km       D2   =    10.7 km    Hm = 3310.0 m    #
#      U     =    -.03          Ld   =     6.4 dB                     #
#                                                                     #
#                                                                     #
#      Lfs   = 102.3 dB         Lfs + Ld  = 108.7 dB                  #
#                                                                     #
#                                                                     #
#######################################################################
```

PATH PROFILE (4/3 RADIUS)

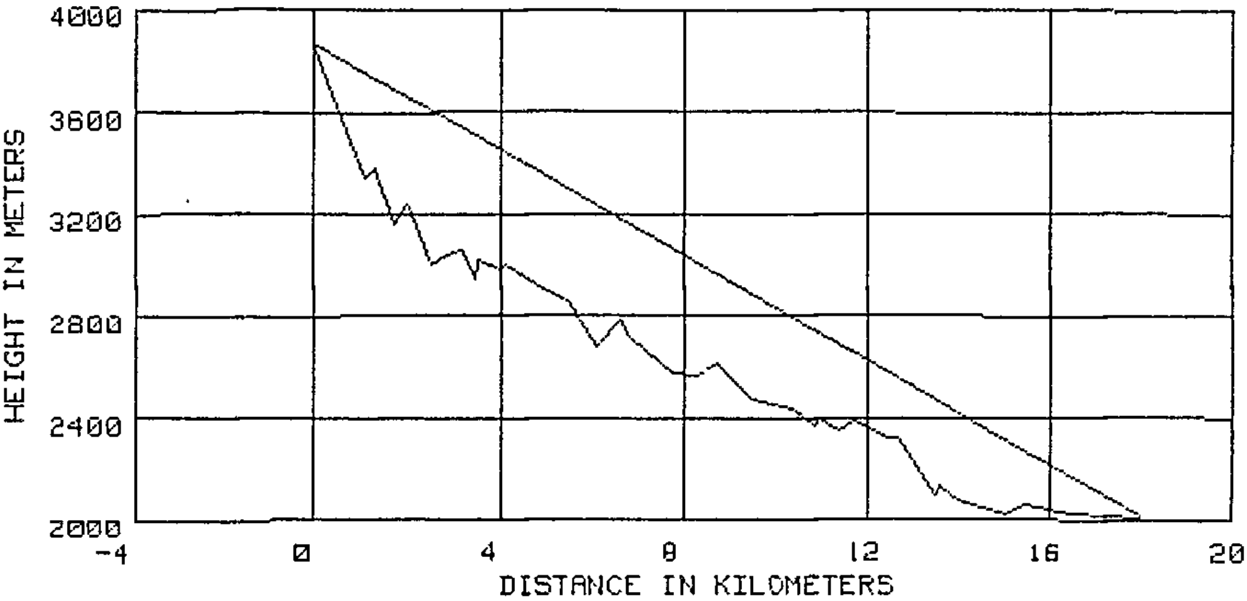


DISTANCE : 57.9 km

SITE 1 : Rep.PELILLOJO	SITE 2 : Rep.COTAGAITA
GROUND ELEVATION: 3760.0 m	GROUND ELEVATION: 2900.0 m
ANTENNA HEIGHT: 10.0 m	ANTENNA HEIGHT: 10.0 m

```
####################################################################
#                                                                  #
#                  PATH CLEARANCE AND RIDGE LOSS                   #
#                                                                  #
#                                                                  #
#       K     =    1.33                                            #
#                                                                  #
#       F     =   160 MHz :  (λ = 1875 mm)                         #
#                                                                  #
#       Hg1   = 3760.0  m       Hg2  = 2900.0  m                   #
#       Ha1   =   10.0  m       Ha2  =   10.0  m                   #
#                                                                  #
#       D1    =   35.0 km       D2   =    22.9 km   Hm = 3360.0 m  #
#       U     =    -.97         Ld   =    16.1 dB                  #
#                                                                  #
#                                                                  #
#       Lfs   = 111.8 dB        Lfs + Ld  = 127.9 dB               #
#                                                                  #
#                                                                  #
####################################################################
```

PATH PROFILE (4/3 RADIUS)

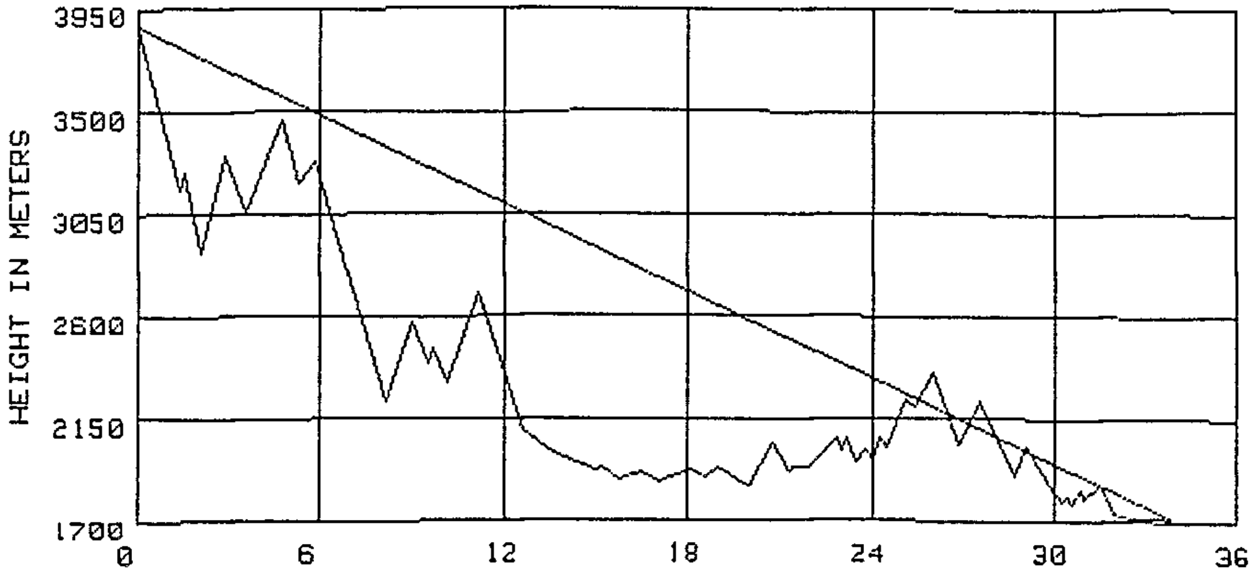


DISTANCE : 18.0 km

SITE 1 : SAMA	SITE 2 : SAN LORENZO
GROUND ELEVATION: 3860.0 m	GROUND ELEVATION: 2010.0 m
ANTENNA HEIGHT: 10.0 m	ANTENNA HEIGHT: 10.0 m

```
##################################################################
#                                                                #
#                PATH CLEARANCE AND RIDGE LOSS                   #
#                                                                #
#                                                                #
#       K    =     1.33                                          #
#                                                                #
#       F    =   160 MHz :  (λ = 1875 mm)                        #
#                                                                #
#       Hg1  = 3860.0  m      Hg2  = 2010.0  m                   #
#       Ha1  =   10.0  m      Ha2  =   10.0  m                   #
#                                                                #
#       D1   =   16.5 km      D2   =    1.5 km   Hm = 2040.0 m   #
#       U    =    2.61        Ld   =    0.0 dB                   #
#                                                                #
#                                                                #
#       Lfs  = 101.6 dB       Lfs + Ld  = 101.6 dB               #
#                                                                #
#                                                                #
##################################################################
```

PATH PROFILE (4/3 RADIUS)



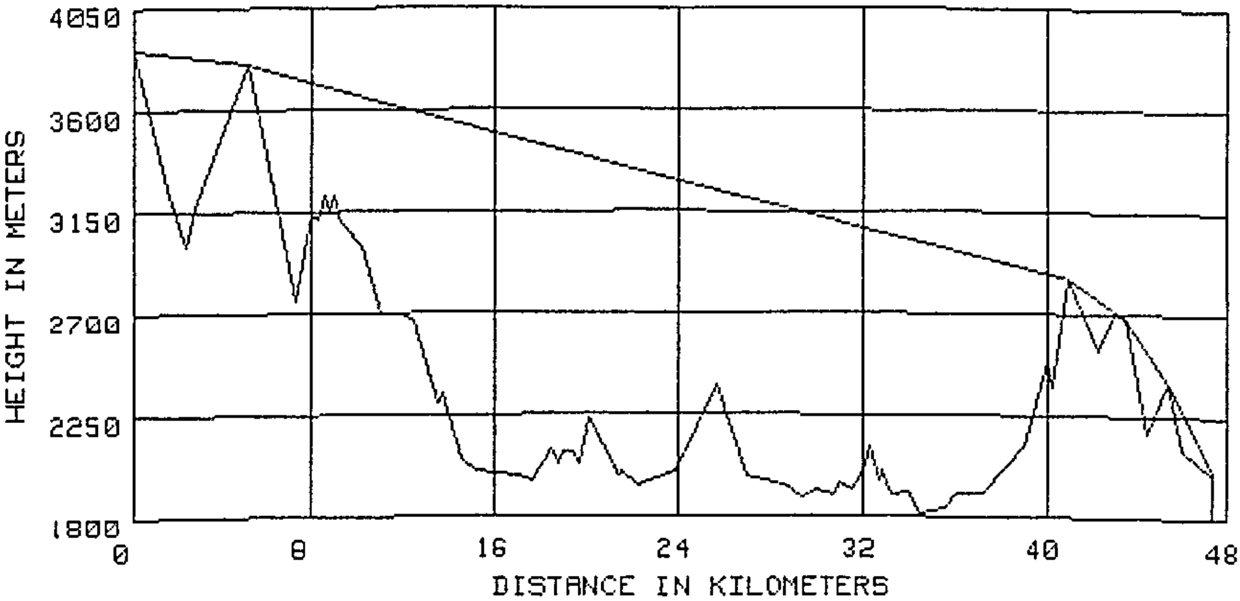
DISTANCE : 33.8 km

SITE 1 : SAMA
GROUND ELEVATION: 3860.0 m
ANTENNA HEIGHT: 10.0 m

SITE 2 : CONCEPCION
GROUND ELEVATION: 1710.0 m
ANTENNA HEIGHT: 10.0 m

```
###################################################################
#                                                                 #
#                PATH CLEARANCE AND RIDGE LOSS                    #
#                                                                 #
#                                                                 #
#       K     =    1.33                                           #
#                                                                 #
#       F     =   160 MHz :  (λ = 1875 mm)                        #
#                                                                 #
#       Hg1   = 3860.0  m       Hg2  = 1710.0  m                  #
#       Ha1   =   10.0  m       Ha2  =   10.0  m                  #
#                                                                 #
#       D1    =   26.0 km       D2   =    7.8 km   Hm = 2370.0 m  #
#       U     =   -1.56         Ld   =   19.9 dB                  #
#                                                                 #
#                                                                 #
#       Lfs   = 107.1 dB        Lfs + Ld  = 127.0 dB              #
#                                                                 #
#                                                                 #
###################################################################
```

PATH PROFILE (4/3 RADIUS)

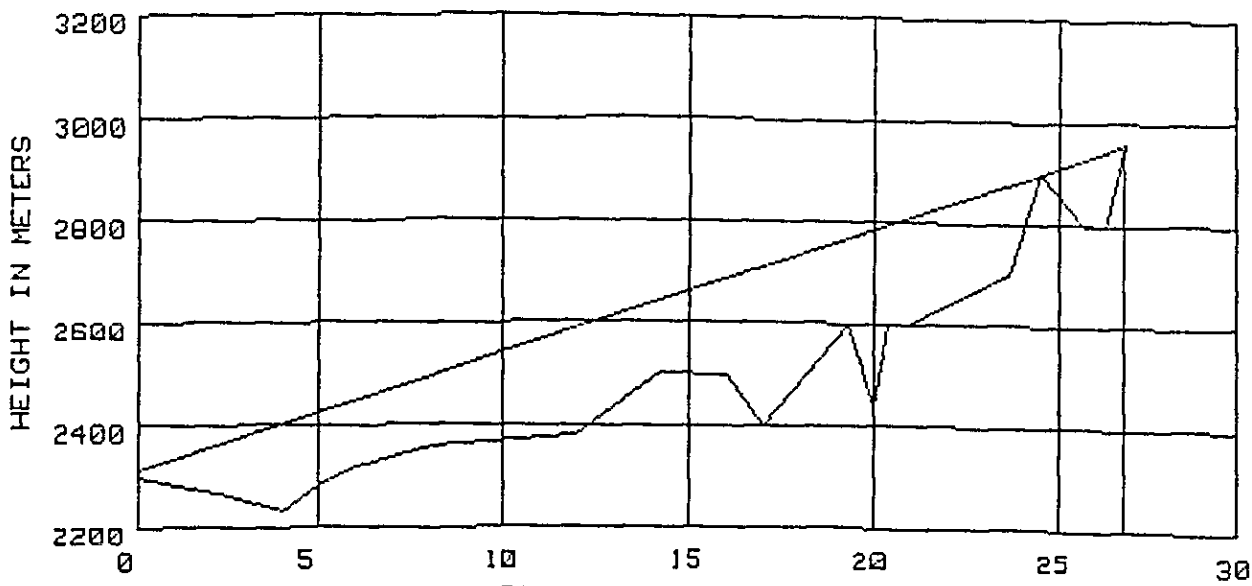


DISTANCE D : 47.4 km

SITE 1 : SAMA	SITE 2 : PADACAYA
GROUND ELEVATION: 3860.0 m	GROUND ELEVATION: 1990.0 m
ANTENNA HEIGHT: 10.0 m	ANTENNA HEIGHT: 10.0 m

```
###################################################################
#                                                                 #
#                  PATH CLEARANCE AND RIDGE LOSS                  #
#                                                                 #
#      K     =    1.33                                            #
#      F     =   160  MHz :  (λ = 1875 mm)                        #
#      Hg1   = 3860.0  m       Hg2  = 1990.0  m                   #
#      Ha1   =    10   m       Ha2  =    10   m                   #
#                                                                 #
#   1: D1    =    5.1 km       D2   =   42.3 km   Hm = 3800.0 m   #
#      U     =    -.73         Ld   =   14.0 dB                   #
#   2: D1    =   41.0 km       D2   =    6.4 km   Hm = 2860.0 m   #
#      U     =  -1.70          Ld   =   20.7 dB                   #
#   3: D1    =   43.5 km       D2   =    3.9 km   Hm = 2680.0 m   #
#      U     =  -2.36          Ld   =   23.4 dB                   #
#   4: D1    =   45.4 km       D2   =    2.0 km   Hm = 2400.0 m   #
#      U     =  -1.69          Ld   =   20.6 dB                   #
#                                                                 #
#      Lfs   = 110.1  dB       Lfs + Ld  = 188.8  dB              #
#                                                                 #
#                                                                 #
###################################################################
```

PATH PROFILE (4/3 RADIUS)



DISTANCE : 26.9 km

SITE 1 : VILLA ABECIA

GROUND ELEVATION: 2300.0 m

ANTENNA HEIGHT: 10.0 m

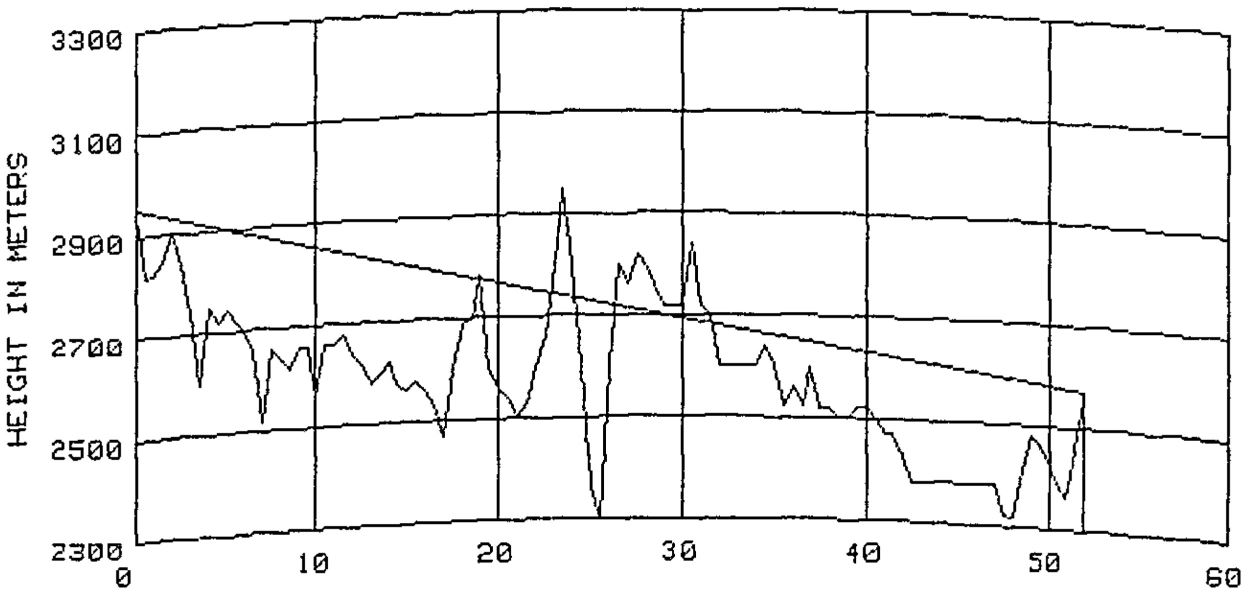
SITE 2 : BALCON

GROUND ELEVATION: 2950.0 m

ANTENNA HEIGHT: 10.0 m

```
#######################################################################
#                                                                     #
#                PATH CLEARANCE AND RIDGE LOSS                        #
#                                                                     #
#                                                                     #
#       K     =     1.33                                              #
#                                                                     #
#       F     =    160 MHz :  (λ = 1875 mm)                           #
#                                                                     #
#       Hg1   = 2300.0   m       Hg2   = 2950.0  m                    #
#       Ha1   =    10.0  m       Ha2   =    10.0  m                   #
#                                                                     #
#       D1    =    24.5 km       D2    =     2.4 km   Hm = 2920.0 m   #
#       U     =     -.34         Ld    =    10.0 dB                   #
#                                                                     #
#                                                                     #
#       Lfs   = 105.1 dB         Lfs + Ld   = 115.2 dB                #
#                                                                     #
#                                                                     #
#######################################################################
```

PATH PROFILE (4/3 RADIUS)

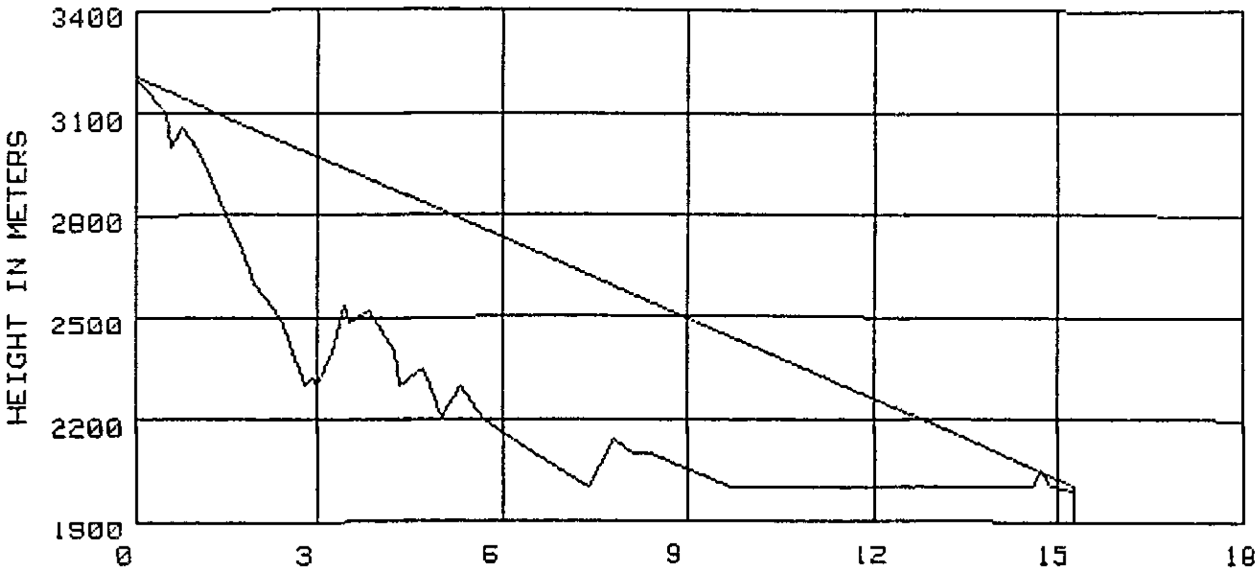


DISTANCE : 52.0 km

SITE 1 : BALCON		SITE 2 : LAS CARRERAS	
GROUND ELEVATION:	2940.0 m	GROUND ELEVATION:	2560.0 m
ANTENNA HEIGHT:	10.0 m	ANTENNA HEIGHT:	10.0 m

```
######################################################################
#                                                                    #
#                  PATH CLEARANCE AND RIDGE LOSS                     #
#                                                                    #
#                                                                    #
#      K     =     1.33                                              #
#                                                                    #
#      F     =   160 MHz :  (λ = 1875 mm)                            #
#                                                                    #
#      Hg1   = 2940.0  m       Hg2  = 2560.0  m                      #
#      Ha1   =   10.0  m       Ha2  =   10.0  m                      #
#                                                                    #
#      D1    =   23.5 km       D2   =   28.5 km   Hm = 2968.0 m      #
#      U     =   -1.47         Ld   =   19.4 dB                      #
#                                                                    #
#                                                                    #
#      Lfs   = 110.9 dB        Lfs + Ld  = 130.3 dB                  #
#                                                                    #
#                                                                    #
######################################################################
```

PATH PROFILE (4/3 RADIUS)

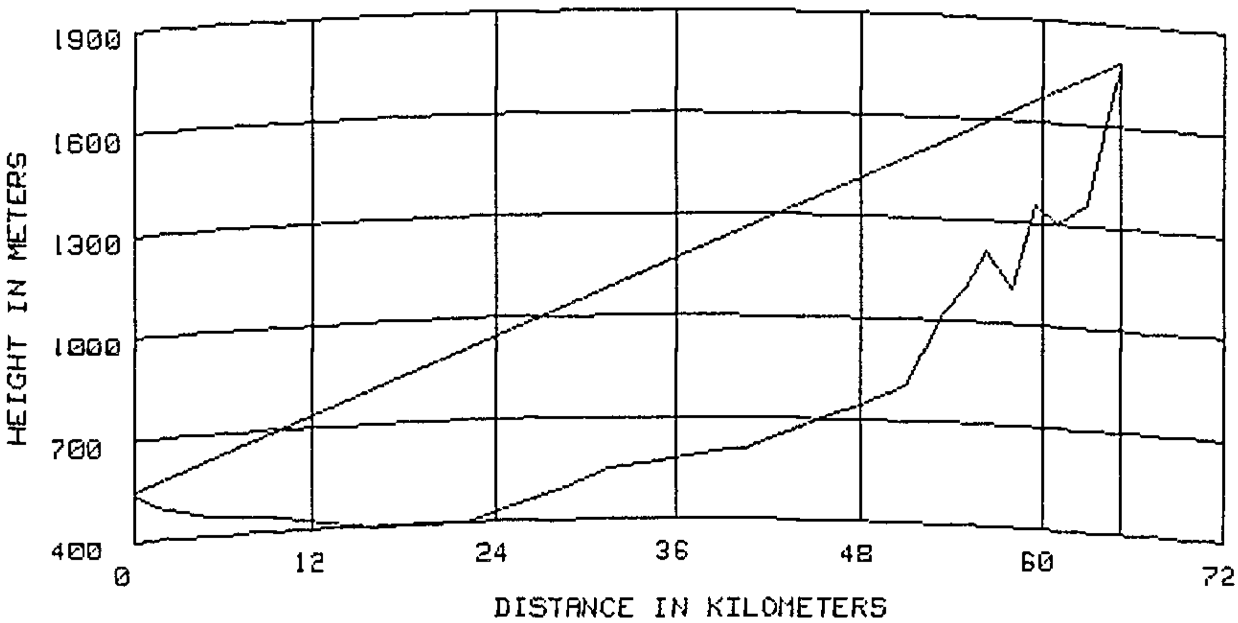


DISTANCE : 15.3 km

SITE 1 : C.ALTO GRANDE	SITE 2 : PADACAYA
GROUND ELEVATION: 3200.0 m	GROUND ELEVATION: 1990.0 m
ANTENNA HEIGHT: 10.0 m	ANTENNA HEIGHT: 10.0 m

```
#####################################################################
#                                                                   #
#                  PATH CLEARANCE AND RIDGE LOSS                    #
#                                                                   #
#                                                                   #
#       K     =     1.33                                            #
#                                                                   #
#       F     =    160 MHz :  (λ = 1875 mm)                         #
#                                                                   #
#       Hg1   = 3200.0  m       Hg2   = 1990.0  m                   #
#       Ha1   =   10.0  m       Ha2   =   10.0  m                   #
#                                                                   #
#       D1    =   14.8 km       D2    =    0.6 km   Hm = 2070.0 m   #
#       U     =    -.86         Ld    =   15.2 dB                   #
#                                                                   #
#                                                                   #
#       Lfs   = 100.2 dB        Lfs + Ld  = 115.4 dB                #
#                                                                   #
#                                                                   #
#####################################################################
```

PATH PROFILE (4/3 RADIUS)

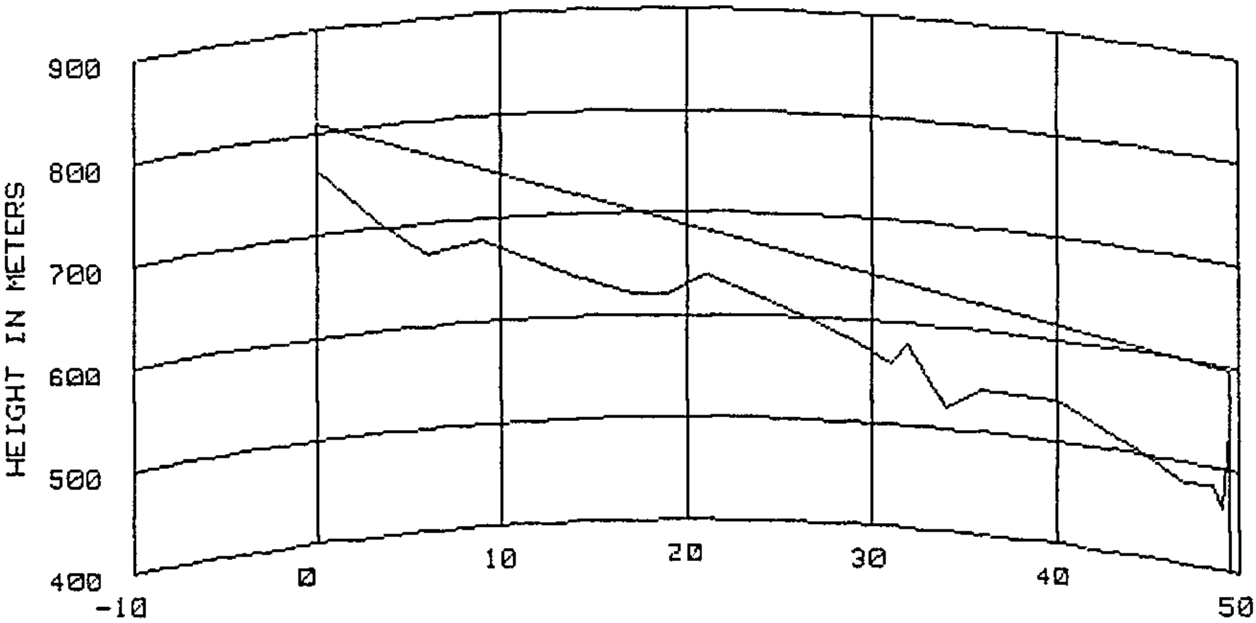


DISTANCE : 65.2 km

SITE 1 : TAIGUANTI		SITE 2 : SANA	
GROUND ELEVATION:	540.0 m	GROUND ELEVATION:	1780.0 m
ANTENNA HEIGHT:	10.0 m	ANTENNA HEIGHT:	10.0 m

```
####################################################################
#                                                                  #
#                 PATH CLEARANCE AND RIDGE LOSS                    #
#                                                                  #
#                                                                  #
#       K     =    1.33                                            #
#                                                                  #
#       F     =  6770 MHz :  (λ =    44 mm)                        #
#                                                                  #
#       Hg1   =  540.0   m       Hg2  = 1780.0   m                 #
#       Ha1   =   10.0   m       Ha2  =   10.0   m                 #
#                                                                  #
#       D1    =   59.6 km        D2   =     5.6 km   Hm = 1370.0 m #
#       U     =   19.51          Ld   =     0.0 dB                 #
#                                                                  #
#                                                                  #
#       Lfs  = 145.4 dB        Lfs + Ld  = 145.4 dB                #
#                                                                  #
#                                                                  #
####################################################################
```

PATH PROFILE (4/3 RADIUS)

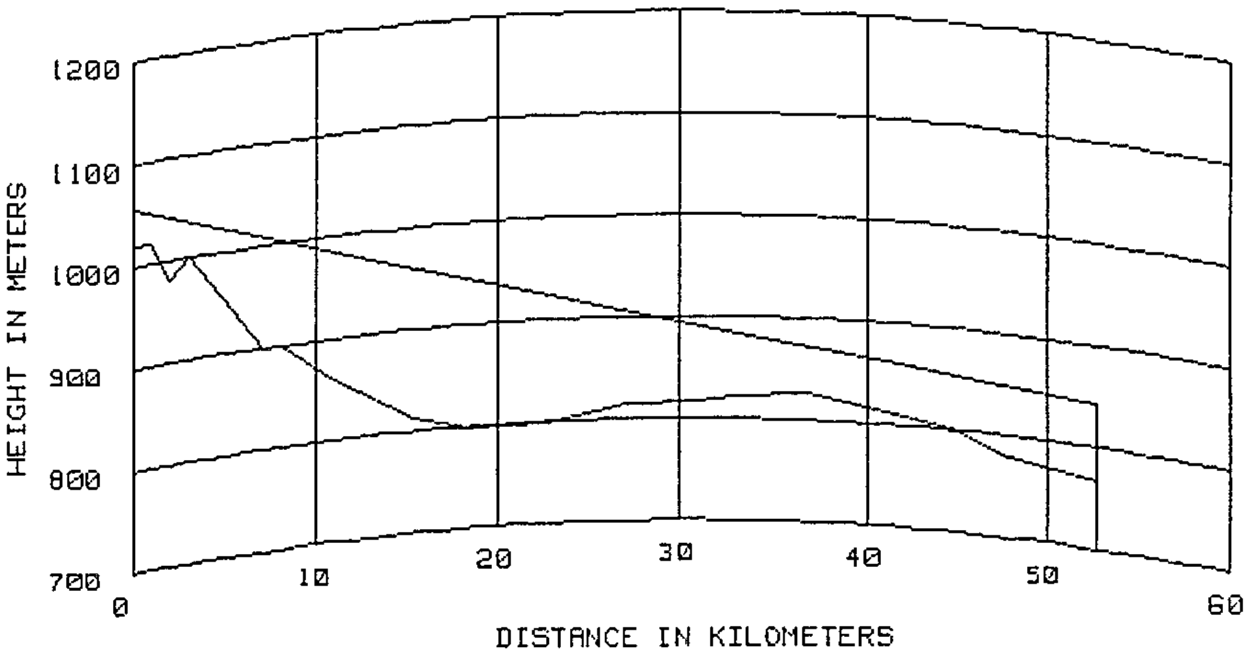


DISTANCE : 49.5 km

SITE 1 : NANCORAINZA	SITE 2 : TAIGUANTI
GROUND ELEVATION: 765.0 m	GROUND ELEVATION: 540.0 m
ANTENNA HEIGHT: 45.0 m	ANTENNA HEIGHT: 55.0 m

```
####################################################################
#                                                                  #
#                 PATH CLEARANCE AND RIDGE LOSS                    #
#                                                                  #
#                                                                  #
#      K     =    1.33                                             #
#                                                                  #
#      F     =  6770 MHz :  (λ =   44  mm)                         #
#                                                                  #
#      Hg1   =  765.0  m      Hg2   =  540.0  m                    #
#      Ha1   =   45.0  m      Ha2   =   55.0  m                    #
#                                                                  #
#      D1    =   21.0 km      D2    =   28.5 km   Hm =  660.0 m    #
#      U     =    1.02        Ld    =    0.0 dB                    #
#                                                                  #
#                                                                  #
#      Lfs   = 143.0 dB       Lfs + Ld  = 143.0 dB                 #
#                                                                  #
#                                                                  #
####################################################################
```

PATH PROFILE (4/3 RADIUS)



DISTANCE : 52.8 km

SITE 1 : HACIENDA HUACARETA

GROUND ELEVATION: 1020.0 m

ANTENNA HEIGHT: 35.0 m

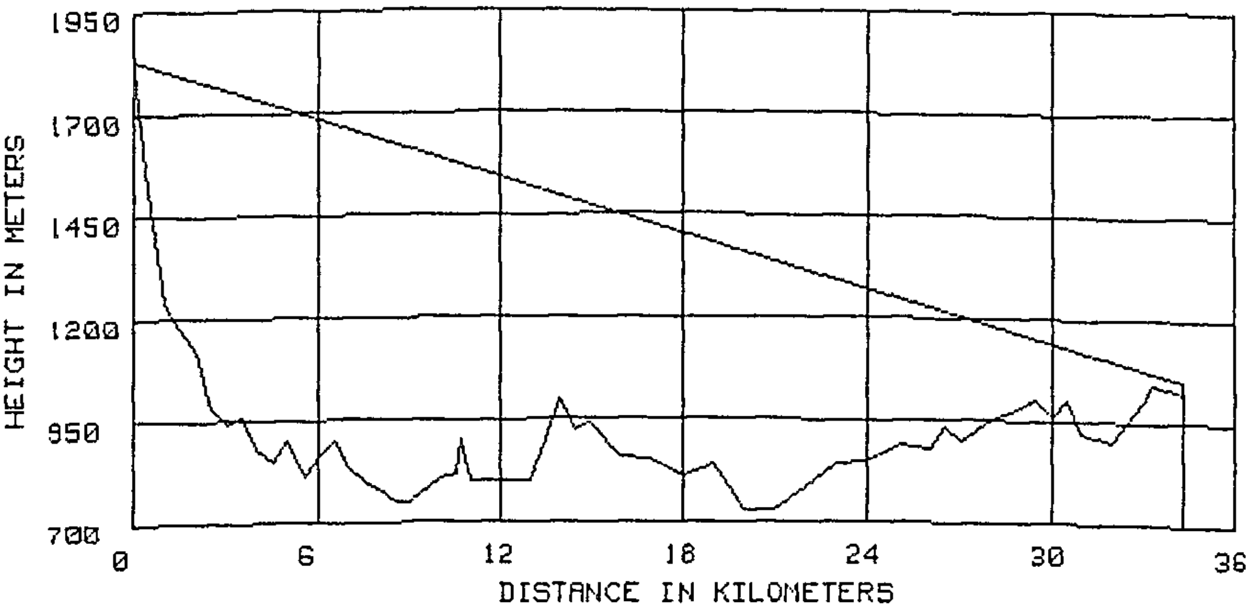
SITE 2 : NANCORAINZA

GROUND ELEVATION: 765.0 m

ANTENNA HEIGHT: 75.0 m

```
#################################################################
#                                                               #
#              PATH CLEARANCE AND RIDGE LOSS                    #
#                                                               #
#                                                               #
#       K     =   1.33                                          #
#                                                               #
#       F     =  6770 MHz :  (λ =    44 mm)                     #
#                                                               #
#       Hg1   = 1020.0  m       Hg2  =  765.0   m               #
#       Ha1   =   35.0  m       Ha2  =   75.0   m               #
#                                                               #
#       D1    =   37.0 km       D2   =   15.8 km   Hm =  847.0 m #
#       U     =    1.03         Ld   =    0.0 dB                #
#                                                               #
#                                                               #
#       Lfs   = 143.5 dB        Lfs + Ld  = 143.5 dB            #
#                                                               #
#                                                               #
#################################################################
```

PATH PROFILE (4/3 RADIUS)

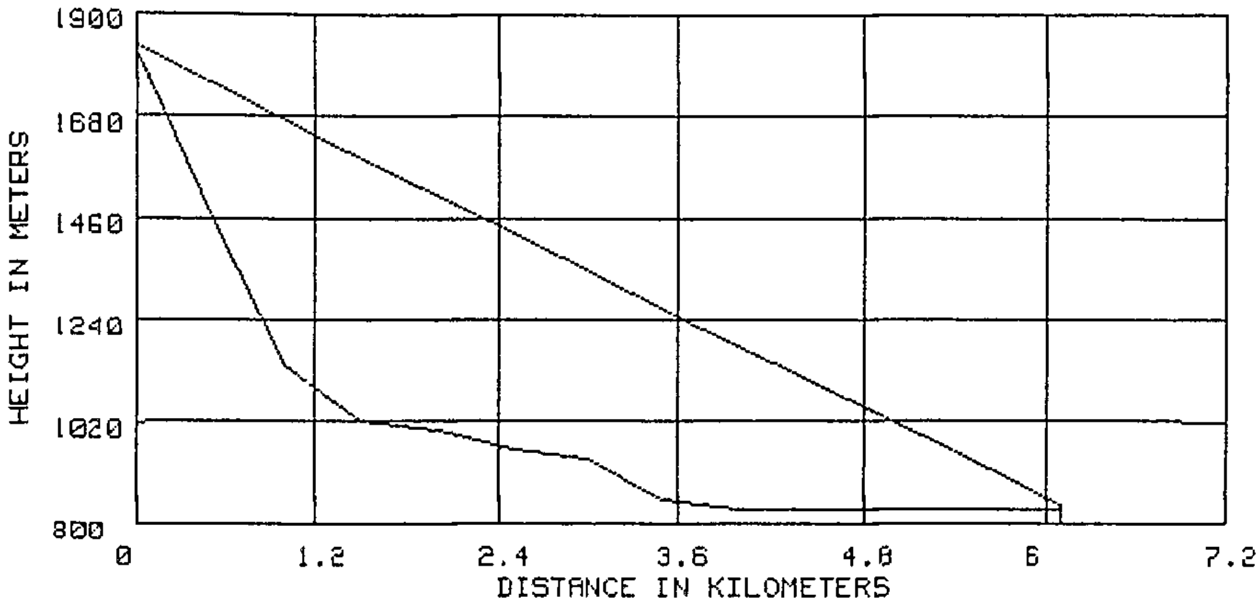


DISTANCE : 34.3 km

SITE 1 : Rep.CAMIRI	SITE 2 : HACIENDA HUACARE
GROUND ELEVATION: 1820.0 m	GROUND ELEVATION: 1020.0 m
ANTENNA HEIGHT: 10.0 m	ANTENNA HEIGHT: 30.0 m

```
##################################################################
#                                                                #
#                PATH CLEARANCE AND RIDGE LOSS                   #
#                                                                #
#                                                                #
#       K     =    1.33                                          #
#                                                                #
#       F     =  6770 MHz :  (λ =    44 mm)                      #
#                                                                #
#       Hg1   = 1820.0  m       Hg2  = 1020.0  m                 #
#       Ha1   =   10.0  m       Ha2  =   30.0  m                 #
#                                                                #
#       D1    =   33.3 km       D2   =    1.0 km   Hm = 1060.0 m #
#       U     =    1.64         Ld   =    0.0 dB                 #
#                                                                #
#                                                                #
#       Lfs   = 139.8 dB        Lfs + Ld  = 139.8 dB             #
#                                                                #
#                                                                #
##################################################################
```

PATH PROFILE (4/3 RADIUS)

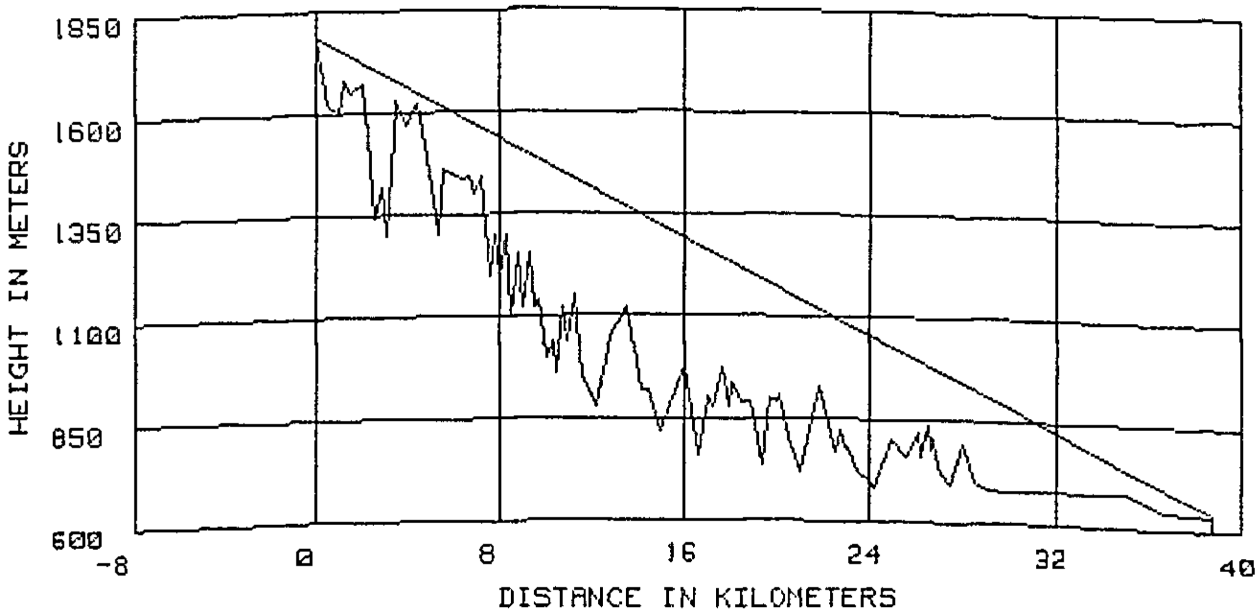


DISTANCE : 6.1 km

SITE 1 : Rep.CAMIRI		SITE 2 : CAMIRI	
GROUND ELEVATION:	1820.0 m	GROUND ELEVATION:	830.0 m
ANTENNA HEIGHT:	10.0 m	ANTENNA HEIGHT:	10.0 m

```
##################################################################
#                                                                #
#                  PATH CLEARANCE AND RIDGE LOSS                 #
#                                                                #
#                                                                #
#       K     =  · 1.33                                          #
#                                                                #
#       F     =  6770 MHz :  (λ =   44 mm)                       #
#                                                                #
#       Hg1   = 1820.0  m      Hg2  =  830.0  m                  #
#       Ha1   =   10.0  m      Ha2  =   10.0  m                  #
#                                                                #
#       D1    =    6.0 km      D2   =    0.1 km   Hm =  850.0 m  #
#       U     =    2.97        Ld   =    0.0 dB                  #
#                                                                #
#                                                                #
#       Lfs   = 124.8 dB       Lfs + Ld  = 124.8 dB              #
#                                                                #
#                                                                #
##################################################################
```

PATH PROFILE (4/3 RADIUS)

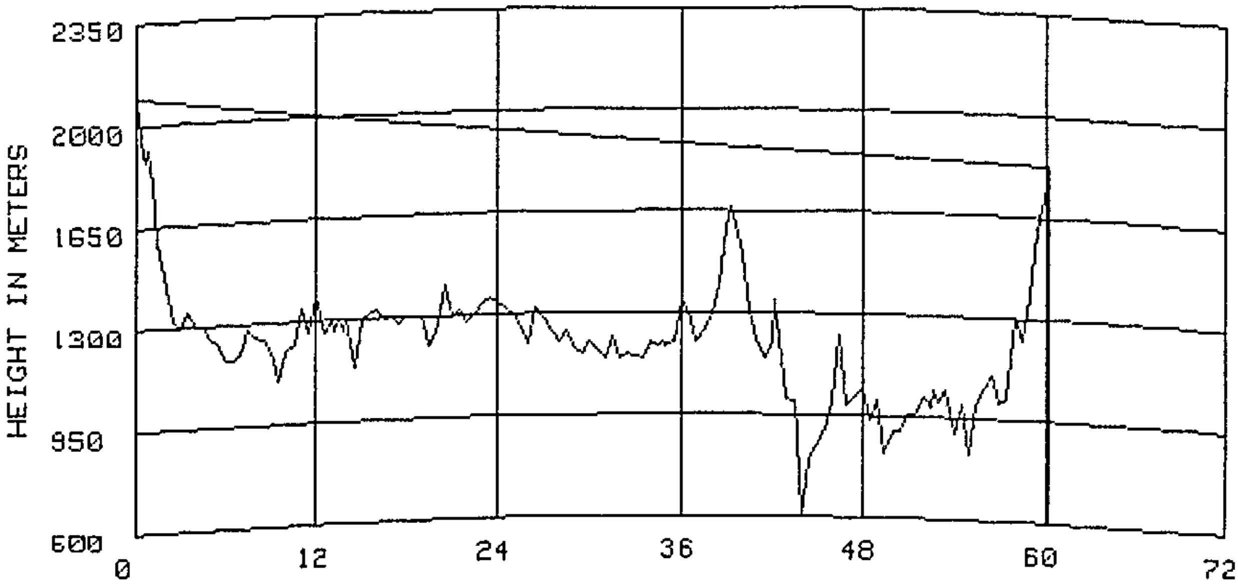


DISTANCE : 38.7 km

SITE 1 : SANA	SITE 2 : YAQUIBA
GROUND ELEVATION: 1780.0 m	GROUND ELEVATION: 630.0 m
ANTENNA HEIGHT: 10.0 m	ANTENNA HEIGHT: 10.0 m

```
##################################################################
#                                                                #
#                PATH CLEARANCE AND RIDGE LOSS                   #
#                                                                #
#                                                                #
#       K     =    1.33                                          #
#                                                                #
#       F     =   900 MHz :  (λ =  333 mm)                       #
#                                                                #
#       Hg1   = 1780.0  m       Hg2   =  630.0  m                #
#       Ha1   =   10.0  m       Ha2   =   10.0  m                #
#                                                                #
#       D1    =    2.0 km       D2    =   36.7 km   Hm = 1690.0 m #
#       U     =    1.44         Ld    =    0.0 dB                #
#                                                                #
#                                                                #
#       Lfs   = 123.3 dB        Lfs + Ld   = 123.3 dB            #
#                                                                #
#                                                                #
##################################################################
```

PATH PROFILE (4/3 RADIUS)

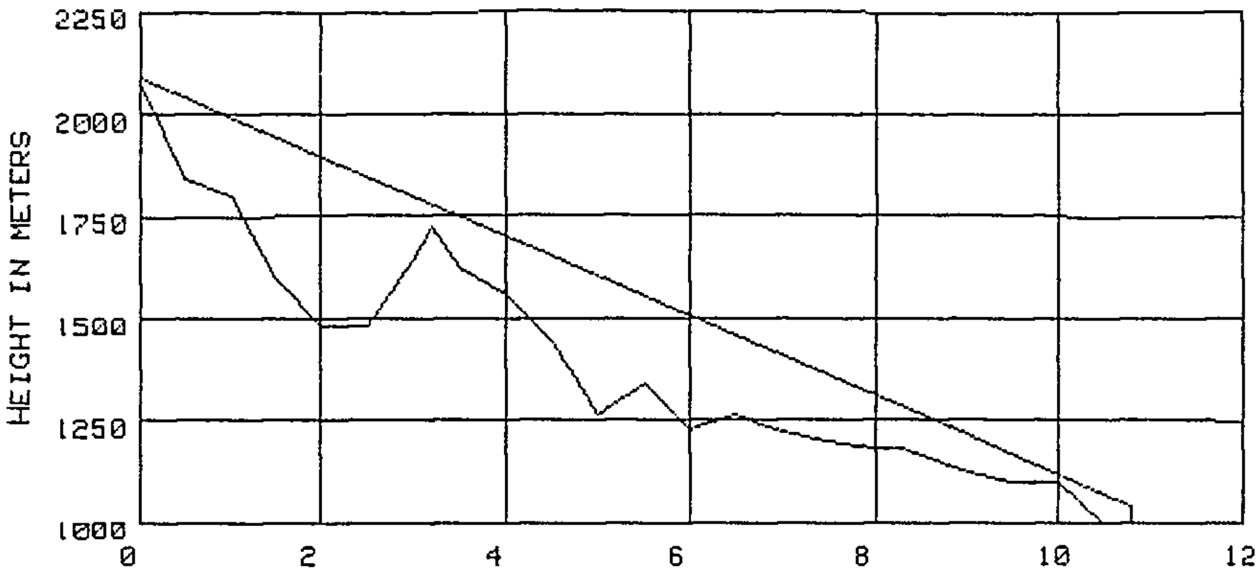


DISTANCE : 60.2 km

SITE 1 : Cerro ASTILLERO	SITE 2 : Rep CAMIRI
GROUND ELEVATION: 2080.0 m	GROUND ELEVATION: 1820.0 m
ANTENNA HEIGHT: 10.0 m	ANTENNA HEIGHT: 10.0 m

```
####################################################################
#                                                                  #
#                  PATH CLEARANCE AND RIDGE LOSS                   #
#                                                                  #
#                                                                  #
#       K     =    1.33                                            #
#                                                                  #
#       F     =   900 MHz :  (λ =   333 mm)                        #
#                                                                  #
#       Hg1   = 2080.0  m      Hg2  = 1820.0  m                    #
#       Ha1   =   10.0  m      Ha2  =   10.0  m                    #
#                                                                  #
#       D1    =   39.3 km      D2   =   20.9 km   Hm = 1680.0 m    #
#       U     =    2.85        Ld   =    0.0 dB                    #
#                                                                  #
#                                                                  #
#       Lfs   = 127.1 dB       Lfs + Ld  = 127.1 dB                #
#                                                                  #
#                                                                  #
####################################################################
```

PATH PROFILE (4/3 RADIUS)

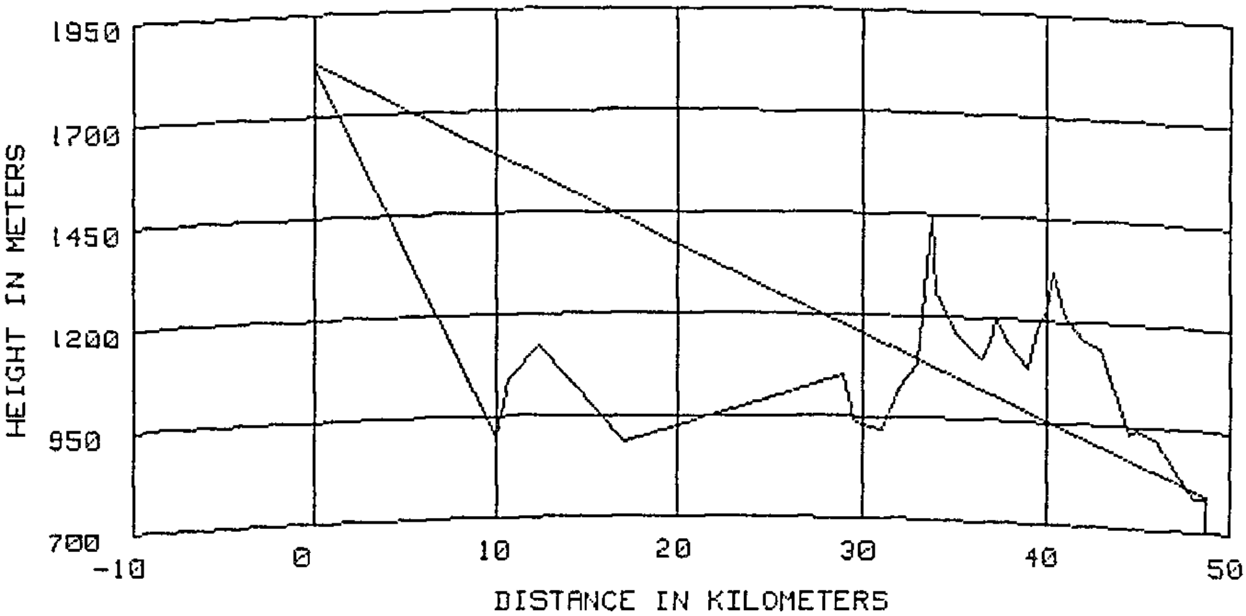


DISTANCE : 10.8 km

SITE 1 : Cerro ASTILLERO		SITE 2 : MONTEAGUDO	
GROUND ELEVATION:	2080.0 m	GROUND ELEVATION:	1000.0 m
ANTENNA HEIGHT:	10.0 m	ANTENNA HEIGHT:	40.0 m

```
######################################################################
#                                                                    #
#                   PATH CLEARANCE AND RIDGE LOSS                    #
#                                                                    #
#                                                                    #
#       K     =    1.33                                              #
#                                                                    #
#       F     =   900 MHz :  (λ =  333 mm)                           #
#                                                                    #
#       Hg1   = 2080.0   m       Hg2   = 1000.0   m                  #
#       Ha1   =   10.0   m       Ha2   =   40.0   m                  #
#                                                                    #
#       D1    =   10.0 km        D2    =    0.8 km    Hm = 1120.0 m  #
#       U     =    -.17          Ld    =    8.1 dB                   #
#                                                                    #
#                                                                    #
#       Lfs   = 112.2 dB         Lfs + Ld  = 120.3 dB                #
#                                                                    #
#                                                                    #
######################################################################
```

PATH PROFILE (4/3 RADIUS)

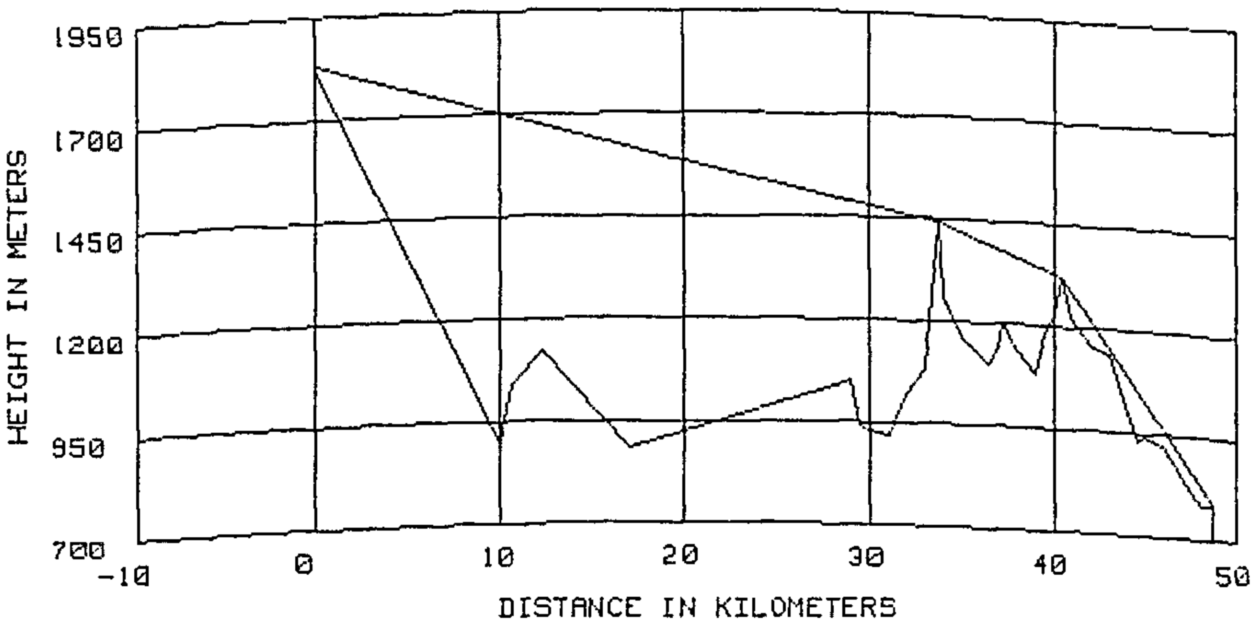


DISTANCE : 48.7 km

SITE 1 :	Rep.CAMIRI	SITE 2 :	CHARAGUA
GROUND ELEVATION:	1820.0 m	GROUND ELEVATION:	780.0 m
ANTENNA HEIGHT:	10.0 m	ANTENNA HEIGHT:	10.0 m

```
#################################################################
#                                                               #
#                 PATH CLEARANCE AND RIDGE LOSS                 #
#                                                               #
#                                                               #
#       K     =     1.33                                        #
#                                                               #
#       F     =    160 MHz :  (λ = 1875 mm)                     #
#                                                               #
#       Hg1   = 1820.0   m       Hg2   =   780.0   m            #
#       Ha1   =   10.0   m       Ha2   =    10.0   m            #
#                                                               #
#       D1    =   33.7 km        D2    =    15.0 km   Hm = 1460.0 m  #
#       U     =   -2.72          Ld    =    24.7 dB             #
#                                                               #
#                                                               #
#       Lfs   = 110.3 dB         Lfs + Ld   = 135.0 dB          #
#                                                               #
#                                                               #
#################################################################
```

PATH PROFILE (4/3 RADIUS)



DISTANCE D : 48.7 km

SITE 1 : Rep CAMIRI

GROUND ELEVATION: 1820.0 m

ANTENNA HEIGHT: 10.0 m

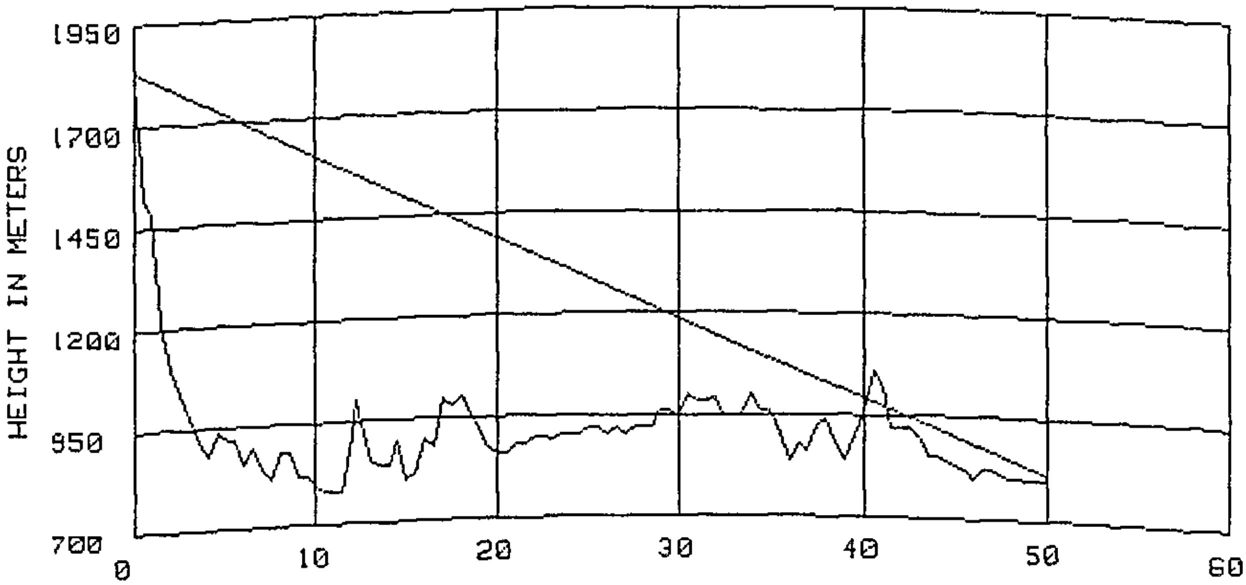
SITE 2 : CHARAGUA

GROUND ELEVATION: 780.0 m

ANTENNA HEIGHT: 10.0 m

```
##################################################################
#                                                                #
#                PATH CLEARANCE AND RIDGE LOSS                   #
#                                                                #
#      K     =    1.33                                           #
#      F     =   160  MHz :  (λ = 1875 mm)                       #
#      Hg1   = 1820.0  m       Hg2   =   780.0   m               #
#      Ha1   =    10  m        Ha2   =    10     m               #
#                                                                #
#   1: D1    =   33.7 km       D2    =   15.0 km   Hm = 1440.0 m #
#      U     =    -.46         Ld    =   11.5 dB                 #
#   2: D1    =   40.5 km       D2    =    8.2 km   Hm = 1320.0 m #
#      U     =   -2.89         Ld    =   25.2 dB                 #
#                                                                #
#      Lfs   = 110.3  dB       Lfs + Ld   = 147.0  dB            #
#                                                                #
#                                                                #
##################################################################
```

PATH PROFILE (4/3 RADIUS)

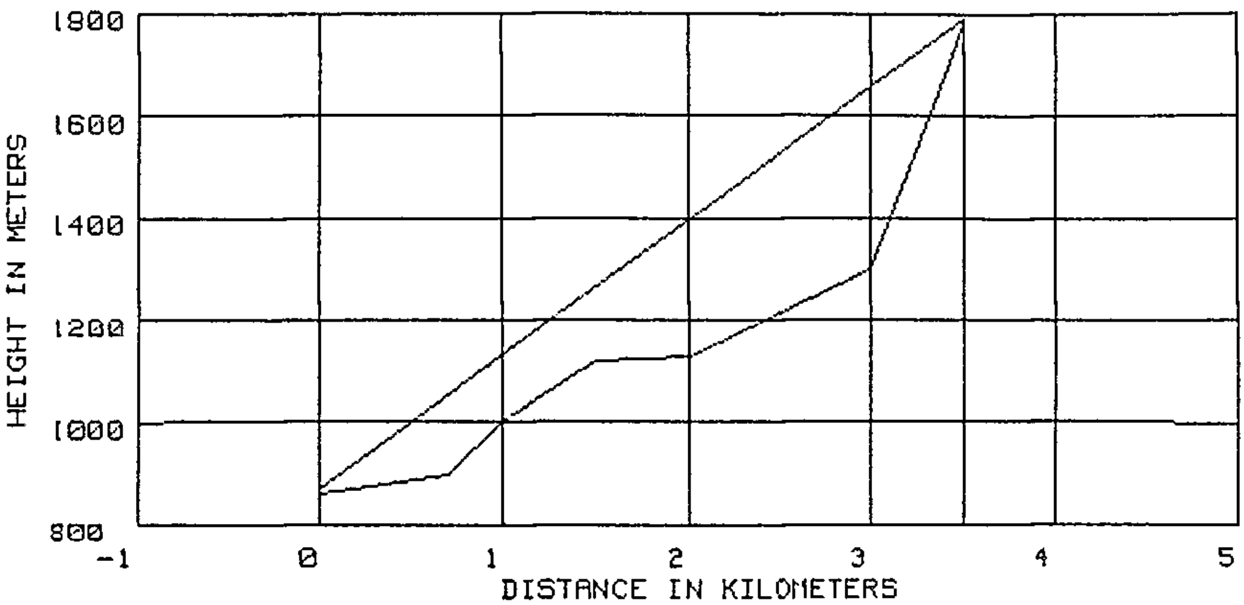


DISTANCE : 50.1 km

SITE 1 : Rep CAMIRI	SITE 2 : BOYUBE
GROUND ELEVATION: 1820.0 m	GROUND ELEVATION: 800.0 m
ANTENNA HEIGHT: 10.0 m	ANTENNA HEIGHT: 10.0 m

```
#################################################################
#                                                               #
#                 PATH CLEARANCE AND RIDGE LOSS                 #
#                                                               #
#                                                               #
#       K     =     1.33                                        #
#                                                               #
#       F     =   160 MHz :  (λ = 1875 mm)                      #
#                                                               #
#       Hg1   = 1820.0  m       Hg2   =  800.0  m               #
#       Ha1   =   10.0  m       Ha2   =   10.0  m               #
#                                                               #
#       D1    =   40.5 km       D2    =    9.6 km   Hm = 1080.0 m #
#       U     =    -.81         Ld    =   14.7 dB               #
#                                                               #
#                                                               #
#       Lfs   = 110.5 dB        Lfs + Ld  = 125.3 dB            #
#                                                               #
#                                                               #
#################################################################
```

PATH PROFILE (4/3 RADIUS)

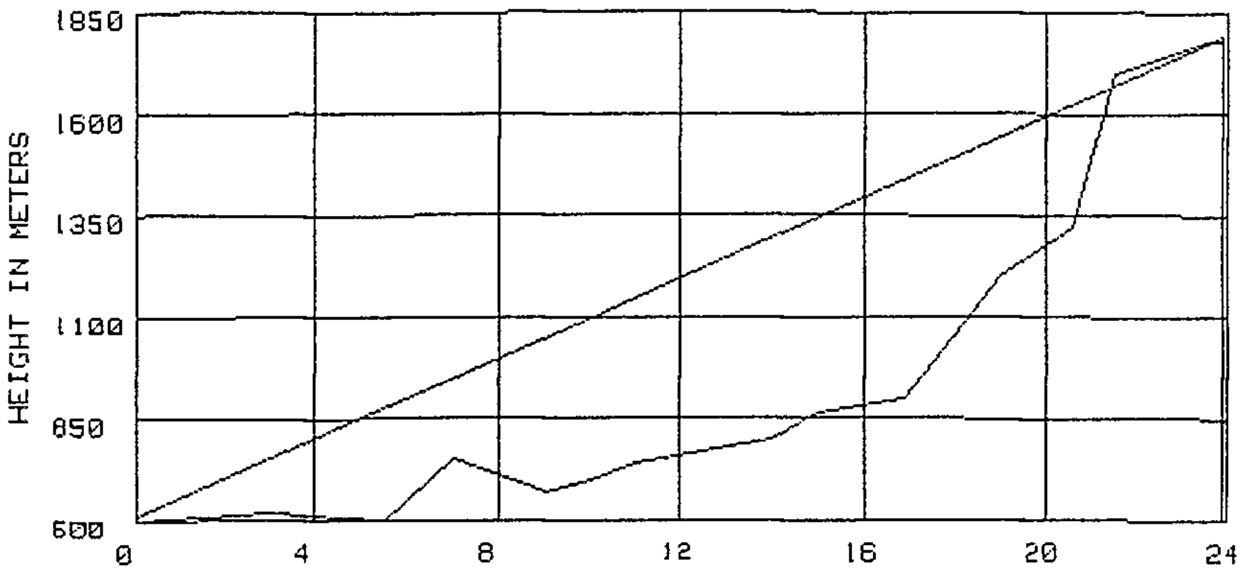


DISTANCE : 3.5 km

SITE 1 : SANANDITA	SITE 2 : SANA
GROUND ELEVATION: 860.0 m	GROUND ELEVATION: 1780.0 m
ANTENNA HEIGHT: 10.0 m	ANTENNA HEIGHT: 10.0 m

```
#################################################################
#                                                               #
#                 PATH CLEARANCE AND RIDGE LOSS                 #
#                                                               #
#                                                               #
#       K     =    1.33                                         #
#                                                               #
#       F     =   160 MHz :  (λ = 1875 mm)                      #
#                                                               #
#       Hg1   =  860.0  m       Hg2  = 1780.0  m                #
#       Ha1   =   10.0  m       Ha2  =   10.0  m                #
#                                                               #
#       D1    =    1.5 km       D2   =     2.0 km   Hm = 1140.0 m  #
#       U     =    3.10         Ld   =     0.0 dB               #
#                                                               #
#                                                               #
#       Lfs   =  87.4 dB        Lfs + Ld   =  87.4 dB           #
#                                                               #
#                                                               #
#################################################################
```

PATH PROFILE (4/3 RADIUS)



DISTANCE : 23.9 km

SITE 1 : EL PALMAR		SITE 2 : SANA	
GROUND ELEVATION:	600.0 m	GROUND ELEVATION:	1780.0 m
ANTENNA HEIGHT:	10.0 m	ANTENNA HEIGHT:	10.0 m

PATH CLEARANCE AND RIDGE LOSS

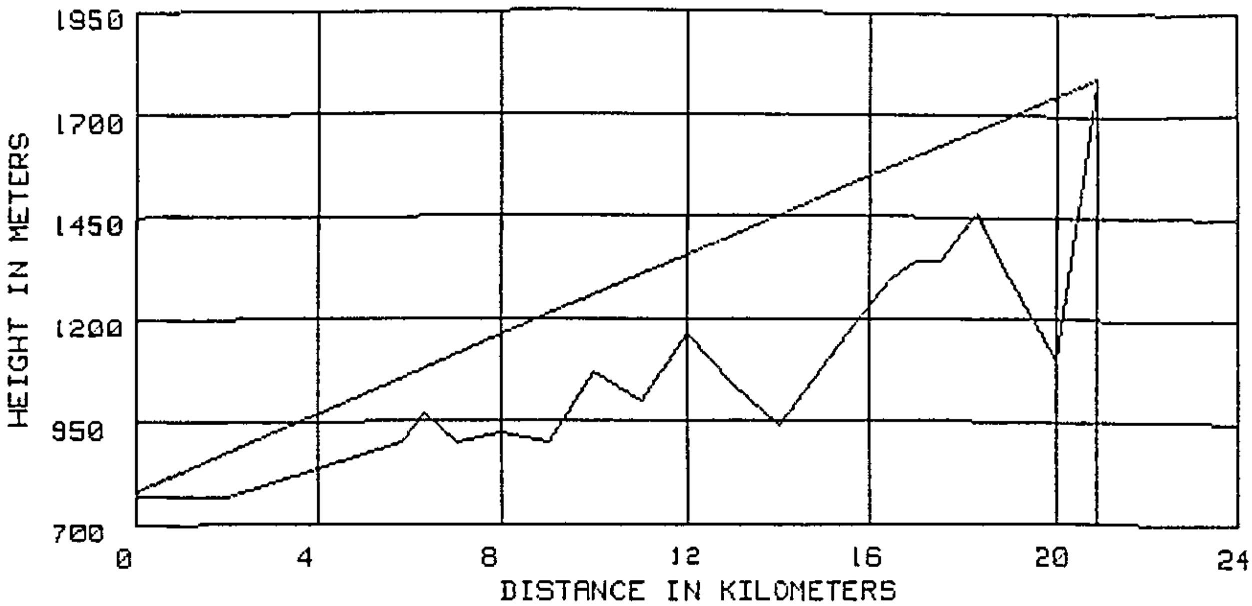
K = 1.33

F = 160 MHz : (λ = 1875 mm)

Hg1	= 600.0 m	Hg2	= 1780.0 m		
Ha1	= 10.0 m	Ha2	= 10.0 m		
D1	= 21.5 km	D2	= 2.4 km	Hm	= 1720.0 m
U	= -.81	Ld	= 14.8 dB		

Lfs = 104.1 dB   Lfs + Ld = 118.9 dB

PATH PROFILE (4/3 RADIUS)



DISTANCE : 20.9 km

SITE 1 : CARAPARI

GROUND ELEVATION: 770.0 m

ANTENNA HEIGHT: 10.0 m

SITE 2 : SANA

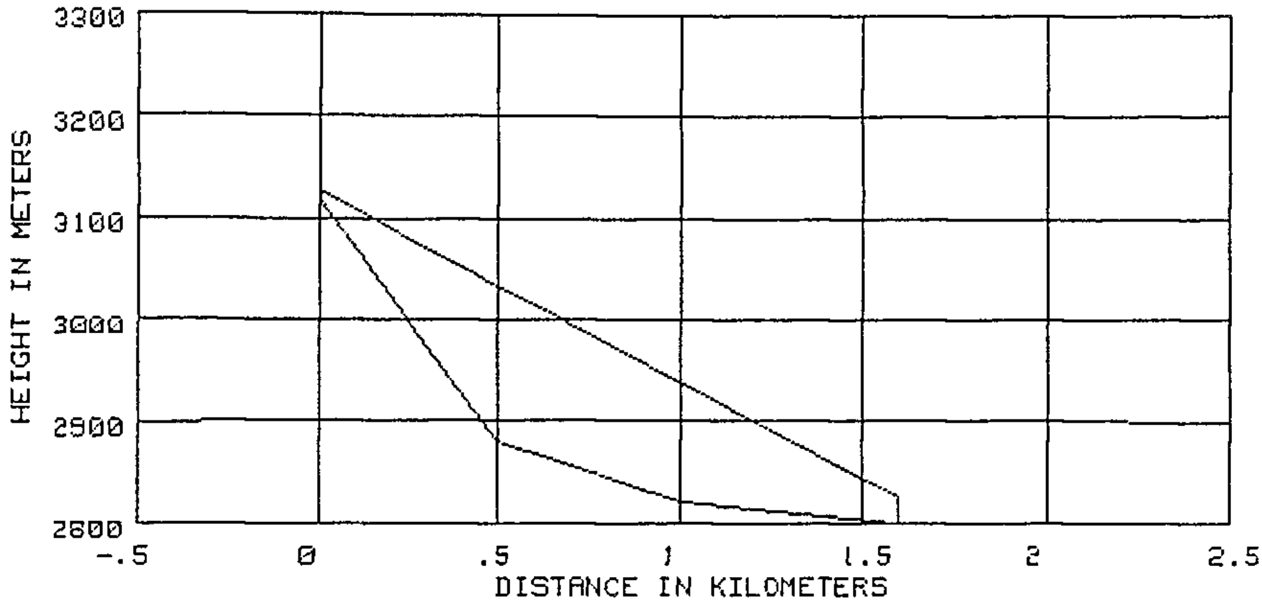
GROUND ELEVATION: 1780.0 m

ANTENNA HEIGHT: 10.0 m

PATH CLEARANCE AND RIDGE LOSS

K = 1.33			
F = 160 MHz : (λ = 1875 mm)			
Hg1 = 770.0 m	Hg2 = 1780.0 m		
Ha1 = 10.0 m	Ha2 = 10.0 m		
D1 = 6.3 km	D2 = 14.6 km	Hm = 990.0 m	
U = 0.98	Ld = 0.0 dB		
Lfs = 102.9 dB	Lfs + Ld = 102.9 dB		

PATH PROFILE (4/3 RADIUS)



DISTANCE : 1.6 km

SITE 1 : Cerro SICA SICA	SITE 2 : SUCRE
GROUND ELEVATION: 3118.0 m	GROUND ELEVATION: 2800.0 m
ANTENNA HEIGHT: 10.0 m	ANTENNA HEIGHT: 25.0 m

PATH CLEARANCE AND RIDGE LOSS

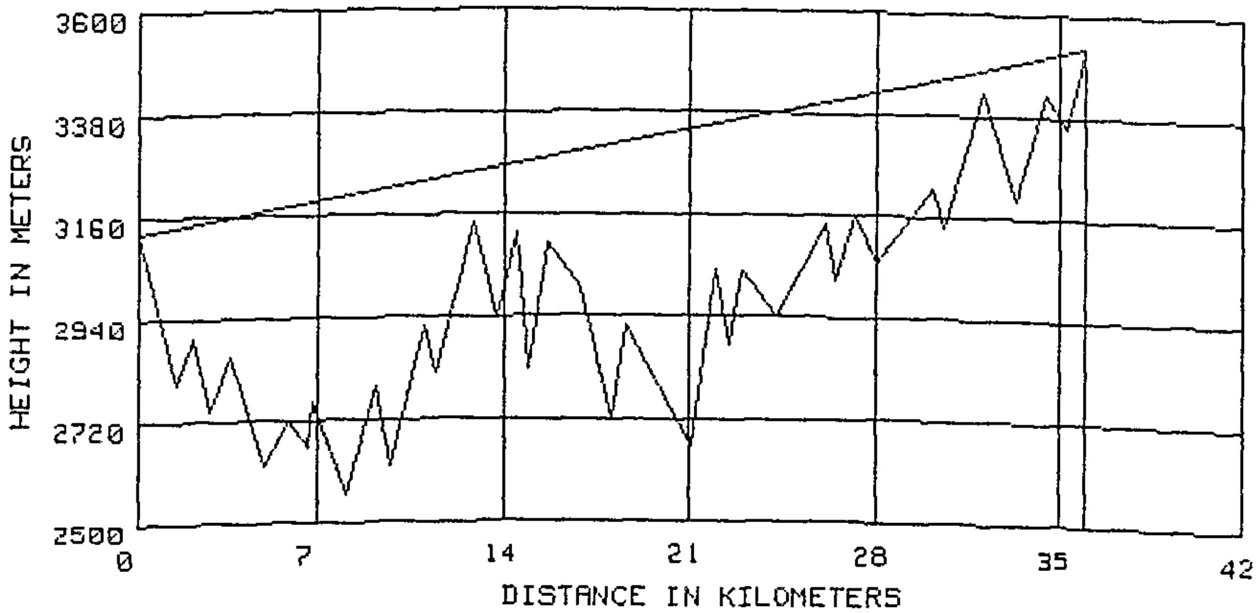
K = 1.33

F = 160 MHz : (λ = 1875 mm)

Hg1 = 3118.0 m	Hg2 = 2800.0 m	
Ha1 = 10.0 m	Ha2 = 25.0 m	
D1 = 1.5 km	D2 = 0.1 km	Hm = 2830.0 m
U = 1.05	Ld = 0.0 dB	

Lfs = 80.6 dB Lfs + Ld = 80.6 dB

PATH PROFILE (4/3 RADIUS)



DISTANCE : 36.0 km

SITE 1 : Cerro SICA SICA
GROUND ELEVATION: 3118.0 m
ANTENNA HEIGHT: 10.0 m

SITE 2 : Rep.TARABUCO
GROUND ELEVATION: 3520.0 m
ANTENNA HEIGHT: 10.0 m

PATH CLEARANCE AND RIDGE LOSS

K = 1.33

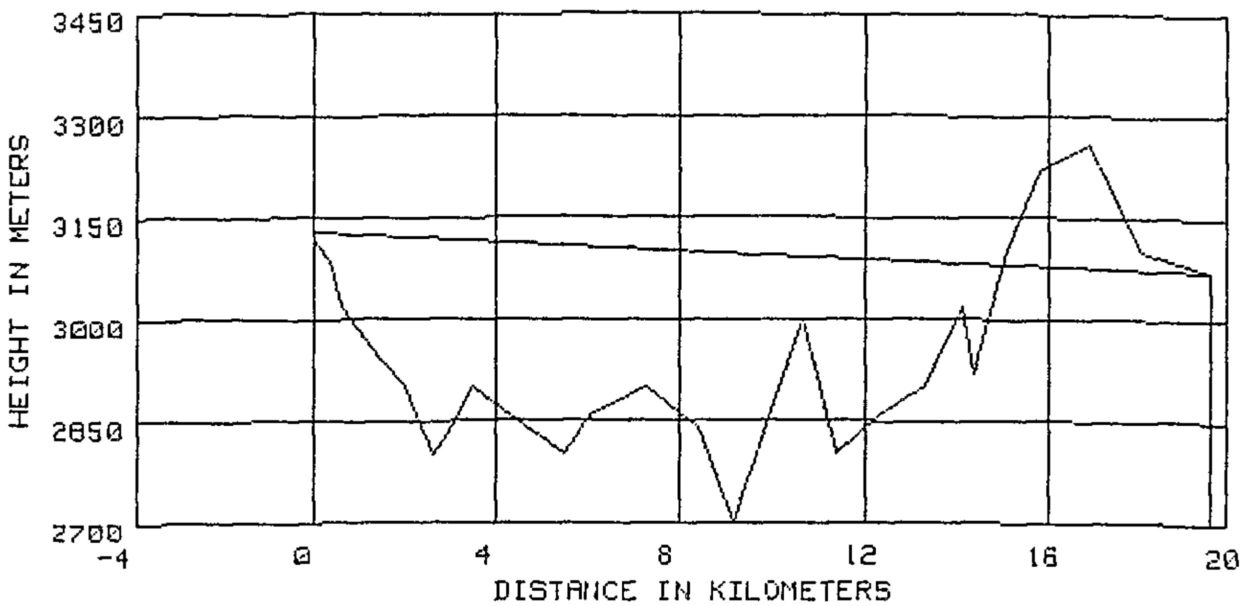
F = 160 MHz : (λ = 1875 mm)

Hg1 = 3118.0 m   Hg2 = 3520.0 m
Ha1 = 10.0 m   Ha2 = 10.0 m

D1 = 32.1 km   D2 = 3.9 km   Hm = 3440.0 m
U = 0.48   Ld = 0.0 dB

Lfs = 107.7 dB   Lfs + Ld = 107.7 dB

PATH PROFILE (4/3 RADIUS)



DISTANCE : 19.6 km

SITE 1 : Cerro SICA SICA	SITE 2 : YAMPAREZ
GROUND ELEVATION: 3118.0 m	GROUND ELEVATION: 3070.0 m
ANTENNA HEIGHT: 10.0 m	ANTENNA HEIGHT: 2.0 m

```
###################################################################
#                                                                 #
#                 PATH CLEARANCE AND RIDGE LOSS                   #
#                                                                 #
#                                                                 #
#       K     =    1.33                                           #
#                                                                 #
#       F     =   160 MHz :  (λ = 1875 mm)                        #
#                                                                 #
#       Hg1   = 3118.0  m       Hg2  = 3070.0  m                  #
#       Ha1   =   10.0  m       Ha2  =   10.0  m                  #
#                                                                 #
#       D1    =   16.9 km       D2   =    2.7 km   Hm = 3270.0 m  #
#       U     =   -2.82         Ld   =   25.0 dB                  #
#                                                                 #
#                                                                 #
#       Lfs   = 102.4 dB        Lfs + Ld  = 127.4 dB              #
#                                                                 #
#                                                                 #
###################################################################
```

ANNEX - VI

Minutes of the Meeting for Feasibility Study on a Telecommunications Network Project in the Republic of Bolivia

MINUTES OF THE MEETING FOR FEASIBILITY STUDY ON A

TELECOMMUNICATIONS NETWORK PROYECT IN THE REPUBLIC OF BOLIVIA

According to the request of the government of the Republic of Bolivia, the government of Japan has sent a feasibility study team on a part of the national telecommunications network project, which is coordinated by J.I.C.A., Japan International Cooperation Agency.

The Japanese study team is headed by Ryoji Sasaki and enforced the field survey and document study relating to the technical and economic feasibility of the project, on the bases of ENTEL and CEPITEL studies submitted to J.I.C.A., which is the official agency responsible for the implementation of technical - cooperation program of the government of Japan. J.I.C.A. will submit the final reports on feasibility study to the government of the Republic of Bolivia, based on the field survey and document study at the early part of next year.

The Japanese study team submitted the interim reports and had a series of discussions with the Bolivian authorities concerned.

As a result of the study and discussions both parties have agreed upon - the attached sheets.

La Paz, December 3, 1981

For Ministry of Transports and Communications, The Government of the Republic of Bolivia.

(Edmundo Aráuz Rea)
Subsecretary of Communications

Tcnl. DIM Jorge Luis Orellana M.
GERENTE GENERAL DE ENTEL

For Japan International Cooperation Agency, The Government of Japan.

(Ryoji Sasaki)
Leader of the Feasibility Study Team.

1. For the discussion of the interim report, meetings were held between ENTEL, CEPITEL and the Japanese Study Team at the conference room of CEPITEL and ENTEL on November 26, 30, December 1 and 2, 1981.
   The list of attendants is given in the attached paper.
2. The representatives of CEPITEL, ENTEL and the Japanese Study Team, discussed the contents of the interim reports.
3. Mr. Edmundo Arauz Rea. Subsecretary of Communications expresed his thanks and hopes to the members of the Japanese Study Team who has enforced the survey and study in response to the request of the government of the Republic of Bolivia.
4. Mr. Ryoji Sasaki, Leader of the Japanese Study Team, appreciated the cooperation extended by CEPITEL and ENTEL to Japanese study team in relation to its field survey and document study.
5. The government of the Republic of Bolivia and the Japanese study team agreed on the following items:
   1) Local telephone offices, trunk telephone offices, transmission routes and MAS (Multi Access Subscriber Telephone System) which are to be newly constructed in the project, are shown in Appendix I.
      Long distance telephone network hierarchy is also shown in Appendix II.
   2) The contents of the studies shown in Appendix I and II are to be reviewed with in-depth study in Japan, and can be modified from the technical and ecnomic view points.
   3) ENTEL promised to submit the list of each project implementation with priority to the Japanese study team by December 31, 1981.
      The Japanese study team agreed to provide ENTEL with the results of study as early as possible.

4) In the undermentioned radio routes, the alternative plans proposed by ENTEL are to be studied in Japan:

   a) Oruro - Negro Pabellón - Llallagua

   b) Oruro - Huanuni

   c) Oruro - Challapata

   d) Tarija - Sama - Bermejo

   e) Negro Pabellón - Colquiri

5) Rural Subscriber Telephone System:

   It is to be studied in Japan which of MAS and Point to Point System should be adopted to the rural subscribers, considering the degree of the development of the corresponding areas and the economic efficiency of the projected routes.

6) TD-ESS (Time Division Electronic Switching System) and analog Trans- - mission System are to be adopted for the newly constructed telephone exchanges and transmission systems respectively, considering that the implementation of the new systems. must be in accordance with the Bolivian National Telecommunications Plans and future programs, in the hope of that J.I.C.A. suggests about modifications and additional subjects needed to get compatibility with the new technology addopted.

7) Toll calls from and to Tupiza and Villazon will be served on a semi-automatic basis.

LIST OF ATTENDANTS

MTC	Mr. Edmundo Arauz Rea	Subsecretary of Communications
CEPITEL	Mr. Remberto Canedo P.	INSTEL
	Mr. Juan José Peralta	ENTEL
	Mr. Remmy Montoya	ENTEL
	Mr. Jaime Ascarrumz	ENTEL
ENTEL	Mr. Jorge Luis Orellana	Gerente General
	Mr. Gonzalo Caba	Jefe Asesoría Planificación
	Mr. Johny Carreón	Jefe del Departamento de Operación y Mantenimiento
	Mr. Juan Carlos Machicao	Jefe del Depto. de Ingeniería
	Mr. Jaime Requena	Jefe División Conmutación
	Mr. Gonzalo Orihuela	Jefe División Instalaciones
	Mr. Jaime Ortiz	Jefe División de Estudios y Proyectos
	Mr. Fernando Moscoso	Jefe División Energía
	Mr. Fernando Arellano	Ingeniero de Conmutación
	Mr. Marcelo Parrado	Ingeniero de Transmisión
	Mr. Javier Ostermann	Ingeniero de Transmisión
	Mr. Julio Fuentes	Economista
	Mr. Marcelo Machicao	Economista
EMBASSY OF JAPAN	Mr. Toshio Watanabe	First Secretary
JAPANESE EXPERT	Mr. Shogo Katakura	D.G.T.
JAPANESE STUDY TEAM	Mr. Ryoji Sasaki	Leader
	Mr. Koichiro So	Member
	Mr. Junichi Sakamoto	Member
	Mr. Susumu Nakao	Member
	Mr. Takao Yamazaki	Member
	Mr. Seiji Harada	Member
	Mr. Takashi Suzuki	Member
	Mr. Sumio Shimizu	Member

	Mr. Ryushi Suenaga	Member
	Mr. Eiki Shimoji	Member
	Mr. Mikio Soma	Member
	Mr. Mitsutoshi Kikuchi	Coordinator
J.I.C.A.	Mr. Yasuhiro Umezawa	Representante Residente de JICA en Bolivia

MINUTES OF MEETING ON THE FEASIBILITY STUDY REPORT ON THE NATIONAL TELECOMMUNICATIONS NETWORK PROJECT IN THE REPUBLIC OF BOLIVIA

In reply to a request of the Government of the Republic of Bolivia for the feasibility study on the national telecommunications netwouk project in the Republic of Bolivia, the Government of Japan had conducted the Feasibility Study and has sent through Japan International Cooperation Agency a supplementary explanation team to the Republic of Bolivia headed by Mr. Ryoji Sasaki, Special Advisor for International Cooperation Division, Minister's Secretoriat, Ministry of Posts and Telecommunications for 15 days from March 17th, 1982. The team submitted Draft Final Report on the above-mentioned feasibility study and has held a series of discussions and exchanged point of view with the Bolivian authorities concerned on the report from March 19th to March 25th, 1982.

The Bolivian authorities are pleased with the workes that led to the " Draft Final Report " elabolation, hence as a result of these and all additional talks with ENTEL/DGT, we agreed on this " Draft Final Repot " waiting for the " Final Reprt " on May, 1982.

In conformity to the above-mentioned , this document is hereby undersigned

FOR JAPAN INTERNATIONAL COOPERATION AGENCY , THE GOVERNMENT OF JAPAN.

(RYOJI SASAKI)
LEADER OF THE JAPANESE TEAM

FOR MINISTRY OF TRANSPORTS AND COMMUNICATIONS THE GOVERNMENT OF THE REPUBLIC OF BOLIVIA.

(EDMUNDO ARAUZ REA)
SUBSECRETARY OF COMMUNICATIONS

(Cnel. DIM JORGE L. ORELLANA M.
GERENTE GENERAL DE ENTEL

ANNEX-VII

Member of Feasibility Study Team

Table VII-1 (1/2) Member of Feasibility Study Team

Name	In Charge of	Affiliated to
Ryoji Sasaki	General Leader	Special Advisor for International Cooperation International Cooperation Div. Minister's Secretariat Ministry of Posts and Telecommunications
(Group-A)		
Susumu Nakao	Group Leader Transmission System	Senior Staff Engineer International Affairs Bureau Nippon Telegraph and Telephone Public Corporation (NTT)
Koichiro So	Transmission System	Technical Official, Land Division, Radio Communications Department, Radio Regulatory Bureau, Ministry of Posts and Telecommunications
Shogo Katakura	Network System	Japanese Telecommunication Expert
Ryushi Suenaga	Network System	Senior Switching Engineer, International Operation Division, The Nippon Telecommunications Consulting Co., Ltd. (NTC)
Eiki Shimoji	Cable System	Cable Engineer, Communication Engineering Division, The Nippon Telecommunications Consulting Co., Ltd. (NTC)
Mikio Soma	Economic Study	Economist, International Operation Division, The Nippon Telecommunications Consulting Co., Ltd. (NTC)

Table VII-1 (2/2) Member of Feasibility Study Team

(Group-B)

Takao Yamazaki	Group Leader Transmission System	Senior Staff Engineer, International Affairs Bureau, Nippon Telegraph and Telephone Public Corporation (NTT)
Junichi Sakamoto	Transmission System	Technical Official, Land Division, Radio Communications Department, Radio Regulatory Bureau, Ministry of Posts and Telecommunications
Seiji Harada	Network System	Senior Staff Engineer, International Affairs Bureau, Nippon Telegraph and Telephone Public Corporation (NTT)
Takashi Suzuki	Transmission System	Manager, Engineering Department, International Operation Division, The Nippon Telecommunications Consulting Co., Ltd. (NTC)
Sumio Shimizu	Cable System	Senior Cable Engineer, International Operation Division, The Nippon Telecommunications Consulting Co., Ltd. (NTC)

(Coordinator from JICA)

Norimoto Ohtake (The former period)		Special Assistant to Director, Social Development Cooperation Dep., Japan International Cooperation Agency (JICA)
Mitsutoshi Kikuchi (The latter period)		ditto

ANNEX - VIII

Itinerary of Field Survey for Feasibility Study

Annex VIII Itinerary of Feasibility Survey

Date	General Leader Coordinator	Group A	Group B	Financial Analyst
1981 October 1	Leave Narita	Same as left	Same as left	
2	Miami	Same as left	Same as left	
3	Arrival La Paz	Same as left	Same as left	
4	Preparation of necessary documents	Same as left	Same as left	
5	Courtesy call to Ambassador of Japan			
	Meeting with JICA	Same as left	Same as left	
6	Meeting with ENTEL	Same as left	Same as left	
7	Meeting with DGT, ENTEL	Same as left	Same as left	
8	Meeting with CEPITEL, ENTEL	Same as left	Same as left	
9	Meeting with ENTEL	Same as left	Same as left	
10	Arrangement of Meeting Results	Same as left	La Paz → Chulumani	
11	Preparation for Field Survey	Same as left	Same as left	
12	La Paz → Tarija, Meeting with ENTEL Tarija	Same as left	Chulumani, C-Torini, Irupana	
13	San Lorenzo, Conception, Tarija	Same as left	Chojlla, Coripata, Coroico	
14	Sama	Same as left	Coroico, Caranavi	
15	Padcaya, La Mamora, Sidras	Same as left	Guanay, Tipuani	
16	Bermejo Tel.office → Tarija	Same as left	Caranavi → La Paz	
17	Tarija → Cochabamba	Entre-Rios, Carapari, Campo-Pajoso	La Paz → Cochabamba	
18	Cachabamba → La Paz	Arrangement of Data	Same as left	
19	Leave La Paz	Yacuiba, Sanjose-pocitos	Tarata, Cliza, Ucureña, Punata, Arani, Tiraque	

Date	General Leader Coordinator	Group A	Group B	Financial Analyst
October 20		Sana, Sanandita, El-parmar, Villamontes	Meeting with ENTEL Cochabamba, and CORDECO	
21		Machareti, Carandaiti	Villa-Tunari, Puerto-Villarroel	
22		Villamontes	Puerto-Patiño	
23		Boyuibe, Quevo, Camiri	Visitto SMTA office Quillacollo, Sacaba	
24		Choreti, C-Camiri	Arrangement of Data	
25		Charagua	Arrangement of Data	
26		Vaca-Guzman, Lagunillas, Monteagudo	Totora, Aiquile, Independencia	
27		Padilla, Tarabuco, Sucre	Mizque	
28		Meeting with ENTEL-Sucre	Meeting with ENTEL, Cochabamba	
29		Sica-Sica, Yanparez Sucre → Santa-Cruz	Arrangement of Data	
30		Visit to COTAS office	Arrangement of Data	
31		Arrangement of Data	Cochabamba → Santa Cruz	
November 1		Arrangement of Data	Same as left	
2		Meeting with JICA	Same as left	
3		Meeting with ENTEL	Same as left	
4		Inspection of Manufactory with ENTEL Staff	Same as left	
5		Meeting by Feild Survey Teams	Same as left	
6		Preparation for Feild Survey	Same as left	
7		Santa-Cruz → La Paz	Santa-Cruz → Sucre	
8		Arrangement of Data	Same as left	

Date	General Leader Coordinator	Group A	Group B	Financial Analyst
November 9		La Paz → Oruro	Sucre → Potosi, Betanzos	
10		Meeting with ENTEL Oruro	Visit to TAP office	
11		Vinto, Negro-Pabellon, Santa-Fé, Machacamarca	Potosi → Uyuni	
12		Colquiri, Viloco	Uyuni, Santa-Ana, Animas, Siete-Suyos	Arrival La Paz
13		Challapata, Huari, Antequera	Atocha, Telamayu, Reforma	Meeting with ENTEL Staff
14		Quime, Caracoles	Santa-Bárbara, Quechisla	Arrangement of Data
15		C-De-Carangas,	Quechisla → Camargo	Arrangement of Data
16		Oruro → La Paz, Corque Caracollo, Eucaliptos, Sica-Sica	Camargo	Meeting with ENTEL Staff
17		Arrangement of Data	Camargo → Tupiza, Villa-Abecia	Ditto
18		Arrangement of Data	Tupiza	Ditto
19	Arrival La Paz	Huarina, Huatajata, Copacabana	Arrangement of Data	Ditto
20	Courtesy call to Ambassador of Japan	Achacachi, Sorata	Villazon	Ditto
21	Arrangement of Data	Mina-Matilde, Pto-Acosta	Villazon → Tarija	Arrangement of Data
22	Arrangement of Data	Arrangement of Data	Same as left	Arrangement of Data
23	Meeting with Japanese Embassy	Tiwanacu, Desaguadero, Guaqui	Tarija → La Paz	Meeting with ENTEL Staff
24	Courtesy call to DGT	Viacha, Corocoro, Patacamaya	Arrangement of Data	Ditto
25	Meeting with ENTEL	Meeting by Feild Survey Teams	Same as left	La Paz → Santa-Cruz
26	Meeting with CEPITEL and ENTEL	Meeting with ENTEL	Same as left	Collecting Data
27	Courtesy call to Ministry of Transports and Communications	Meeting with ENTEL	Same as left	Santa-Cruz → La Paz

Date	General Leader Coordinator	Group A	Group B	Financial Analyst
November 28	Preparation of Interim Report	Same as left	Same as left	Collecting Data
29	Preparation of Interim Report			
	Meeting of all Survey members	Same as left	Same as left	Same as left
30	Meeting with ENTEL	Same as left	Same as left	Same as left
December 1	Meeting with ENTEL	Same as left	Same as left	Same as left
2	Meeting with ENTEL	Same as left	Same as left	Same as left
3	Submission of Interim Report to the under secretary of MTC and signature of minits of meeting	Same as left Same as left	Same as left Same as left	Same as left Same as left
4	Report to Japanese Embassy and JICA office	Same as left	Same as left	La Paz → Oruro
5	Preparation for Departure	Same as left	Same as left	Oruro → La Paz
6	Leave La Paz	Same as left	Same as left	Same as left
7	Los Angeles	Same as left	Same as left	Same as left
8	Leave Los Angeles	Same as left	Same as left	Same as left
9	Arrival Narita	Same as left	Same as left	Same as left

JICA