

5-2 Work Order and Service Order

(1) Daily Number of work order in one OPMC

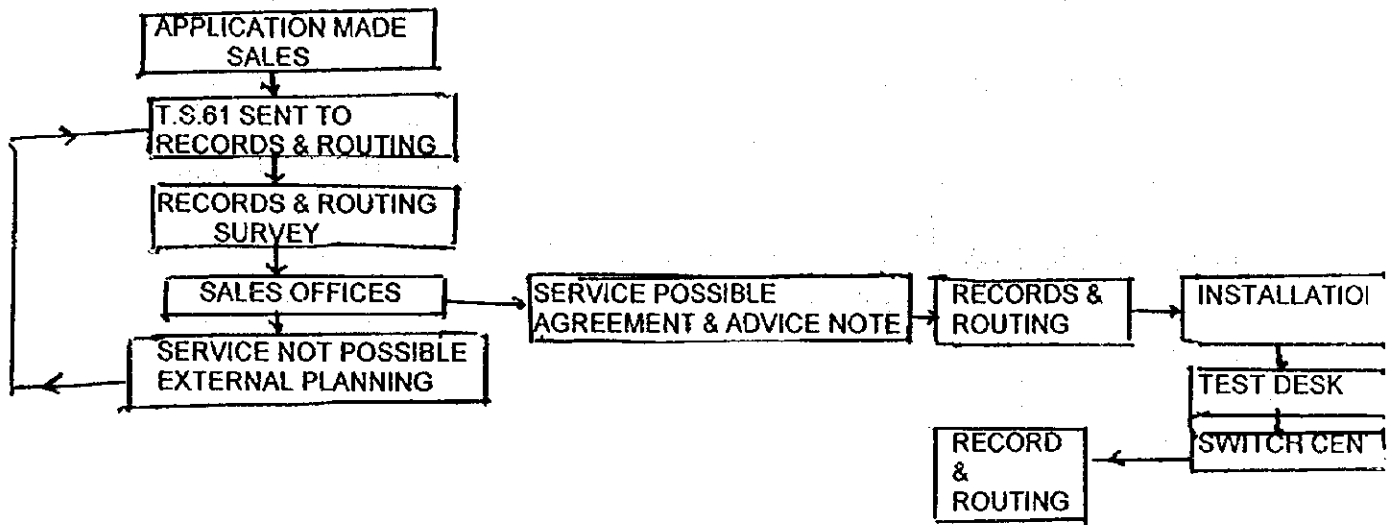
Work order : New connection , Change Facility and disconnection.

SECTION	NEW CONNECTION	CHANGE FACILITY	DISCONNECTION	REMARKS
Switch	7 - 12	1-3	3 - 5	
Primary Cable	7 - 12	-	3 - 5	
Cabinet	7 - 12	-	-	
Secondary Cable	7 - 12	-	-	
D.P	7 - 12	-	-	
Subs Premises	7 - 12	-	-	

5-3 Procedure of Work Order Processing From Applicant Until Line Activation .

- (a) Applicant :- The applicant applies for the type of service required and is given a reference number by Sales Office.
- (b) Order :- A Form T.S. 61 which indicates the applicant name, address and type of service required is sent to the Records and Routing Office.
- © Assignment of Facility :- Records and Routing then surveys the area to determine if service is possible. The cable details are indicated on the T.S.61 Form and sent back to Sales Office.
- (d) Assignment of Facility :- Sales Office prepares an Agreement Form for the applicant, which is duly signed by the applicant and payment is made. A works Instruction Form is prepared (Advise Note) and sent to Installation group via Records and Routing and a copy to the Switch Center.
- (e) Dispatch :- The Installation Team installs the facilities at the subs premises and Test Desk is informed to jumper at the Main Distribution Frame (M.D.F).
- (F) Line Activation :- The Switch Center after receiving the advise note from Test Desk then programs (Activates) the number. The advise note is then sent to Sales Office via Records and Routing.

PROCEDURE OF WORKS



5-4 SERVICE LIFE OF TELECOMMUNICATIONS FACILITIES

	YEAR	JUDGEMENT xxx	REMARKS
Underground Cable (Metal)	15 Years	(注)	
Aerial Cable (Metal)	15 Years		
Cabinet	Over 10 Years		
Telephone Pole	25 Years		
Protector and D.P	05 - 10 Years		
Manhole and Joint box	30 Years		
Duct or conduit Line	25 Years		
Others			

(注) 寿命の数値は、何らかの情報から、先進国のものを使用していると考えられる。

6. FACILITY FAULT REPAIR WORK

6-1 Large scale fault prevention measure (Metal cable and Junction cable). The climatic weather condition in Zambia is either cold, dry and wet. It is the wet condition that brings a lot of cable faults (Nov - April). Therefore, to prevent large scale faults during this season, prevention measures such as the following are undertaken.

- Closure of all exposed joints
- Changing portions of bad cables in the network.
- Replacing Joint Box covers. (Those that are broken or missing)
- And other measures that might prevent faults from occurring.

The other big problem faced by Zamtel is Vandalism of the external cable network. Cases of vandalism are generally on the increase. Each time vandals strike, so many Telecommunications circuit go out of order. To avoid vandals gaining access to our cables, lockable joint boxes are being encouraged on the Primary Side and Aerial cables are being discouraged.

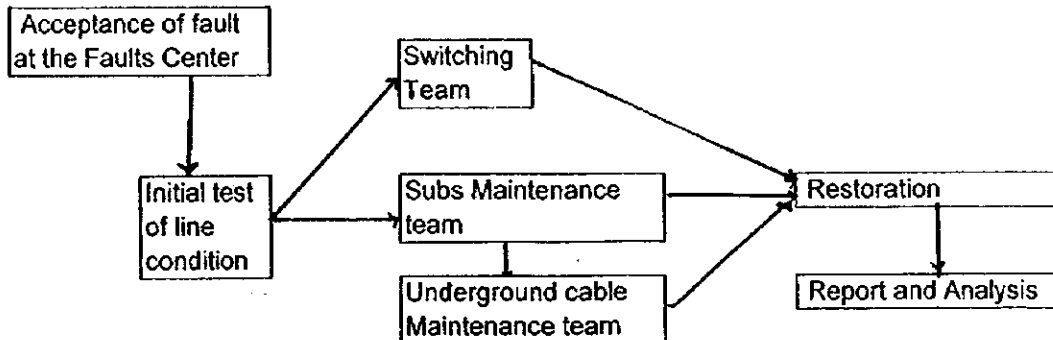
(注) 「A級障害」という概念はなし。一般障害が多発する場合のことを述べている。

The average time required for large scale faults recovery is 24 - 48 hours

The Manual and / or standard documentation available in Zamtel for large scale fault prevention measures is called the "Engineering Instruction".

6.2 Work Flow For Fault Repair Process of Subscribers Line (Access network)

(1) Standard Procedure



6-2 (2) 障害修理に関するマニュアル類はなし。

6-2 (3) Work Demarcation

There are Two (2) major teams involved in the line plant maintenance.

1. Subscriber's Apparatus Maintenance Teams - These start from the D.P up to the apparatus.
2. Underground Cable Maintenance Team - These start from the M.D.F through the cabinet to the D.P.

6-2 (4) Reporting

All faults are reported to the "Faults Centre" on a Toll free number 109.

6-2 (5) After restoration of a Telephone Line, a fault analysis report is indicated on the subscriber's card.

6-3 Failure rate per 100 subscriber line / telephone number and in monthly.

SECTION	CURRENT RATE	TARGET RATE	IDEAL RATE
Total access network			
Primary side	71.9 %	40.3 %	25.7 %
Secondary side	12.6 %	58 %	25 %
Drop wire and Protector	10.5 %	2 %	30%
Subscriber Premises Equipment	-	-	--
Telephone Set	-	-	-

6-4 Average of time required for fault recovery

SECTION	CURRENT TIME DURATION	TARGET TIME DURATION
Cable Network	実態は不明	24時間
Telephone Equipment	1～2時間以内に切分け試験	1時間以内にケーブルと宅内側の切分けを実施
Subscriber Premise Equipment	同上	同上

6-5 COUNTERMEASURES FOR IMPROVEMENT OF OUTSIDE PLANT FACILITIES

(1) Statistic analysis for repair work

- By Cause :- 障害原因等による統計的分析はできていない。
- By Repair Method :- 障害係の係長は、経験的に障害多発箇所を知っており、時々対策を行っている。
- By Fault Point Or Section :-
- By Constructed Year :-
- By Area Such As D.P Cabinet and Exchange :-

(2) Feed back to designing and planning section

- Replacement :- 原則として、既設設備の取り替え等は保全部門が扱い、設計、計画部門及び建設部門は新設設備を扱う。
- Others :- しかし、保全部門で手におえないような既設設備の更改は、保全部門から計画部門または建設部門へ文書または口頭で依頼する。

7. MEASUREMENT TOOLS

- (a) Subscribers Line Test Equipment :- The equipment used is a Line Tester (Incorporates the Ohmmeter, Voltmeter, and Ammeter)
- (b) Measurement and search tool for fault point on Metal Cable (underground and Aerial) :- The equipment used are Avometer, Ohmmeter 18B / C, EchoTester and Bridge Megger
- © Digital Checker for Subscriber In - House Wire :- Nil

7-2 Optical Fiber Cable (対象ケーブルなし)

- (a) Optical Power Tester :-
- (b) Optical Time Domain Reflectometer (OTDR) :-
- © Optical Fiber Continuity Test Equipment :-

7-3 Management System For Optical Fiber Cable (対象ケーブルなし)

- (a) Automatic System For Optical Fiber Cable :-
- (b) Fiber Transfer And Test System :-

8. FACILITY MANAGEMENT SYSTEM

8-1 Management of Access Network Information.

Management of Access Network Information such as M.D.F, Primary Cable Details, Cabinets, Secondary Cable Details D.P Details and Subscriber Premises are kept manually by way of D.P Cards, Cabinet Cards or M.D.F Cards. In Lusaka (Capital City), This system is being computerized. A sample of the D.P. Card is attached for easy reference.

8-2 Customer Information Management

When a telephone line is installed, Zamtel opens a customer file which contains such information as Customer Name and Address, Telephone Number, Certificate of Incorporation or National Registration Number (N.R.C). The file will also show what telephone facilities have been applied for (IDD, Restricted Dialing, Follow Me etc). Please note that fault trouble and complaint information is only found on the subscribers card kept at the Test Desk.

8-3 Facility Location And Capacity Management Based On Geographical Map..

- (a) Location :-
- (b) Diagram :-
- © Part Map :-

(注) 地形図方式に基づく設備管理は全くなされていない。

9. OTHERS.

9-1 We would like to acquire skills in Planning, Construction, Maintenance and Management of External Plant.

9-2 We would like to improve our current telecommunication work especially the maintenance of External Cable Network and current Marketing Strategies.

9-3 As Zamtel we have an interest in all programs, that is Planning, Construction and Maintenance.

9-4 Training shall be made use of in many ways :- Officers who attend courses at home and abroad shall be required to impart knowledge into others by way of Seminars or Workshops.

ANNEX : QUESTIONNAIRE ;

Part -2 Priority on outside plant training curriculums

Please mark the grade of priority (A : very high, B : high, C :normal, D :low) on each item to be covered in the course.

- | | |
|--|--|
| (1) Planning for facility | (A <input checked="" type="radio"/> B C D) |
| (2) New technologies for outside plant such as optical fiber, etc. | (<input checked="" type="radio"/> A <input checked="" type="radio"/> B C D) |
| (3) New technologies for outside plant such as PHS-WILL, etc. | (A B <input checked="" type="radio"/> C D) |
| (4) Maintenance management for outside plant | (<input checked="" type="radio"/> A B C D) |
| (5) Operation, monitoring and emergency measures for outside plant | (<input checked="" type="radio"/> A <input checked="" type="radio"/> B C D) |
| (6) Skills for maintaining plants and detecting and repairing faults | (<input checked="" type="radio"/> A B C D) |
| (7) Actions to be taken to improve the service quality | (<input checked="" type="radio"/> A <input checked="" type="radio"/> B C D) |
| (8) Outside plant designing Knowledge and skills of telecommunication access network designing | (A <input checked="" type="radio"/> B C D) |
| a. Basic design | (<input checked="" type="radio"/> A <input checked="" type="radio"/> B C D) |
| b. Ground design | (<input checked="" type="radio"/> A <input checked="" type="radio"/> B C D) |
| c. Demand forecast | (<input checked="" type="radio"/> A B <input checked="" type="radio"/> C D) |
| d. Optical fiber design | (<input checked="" type="radio"/> A B <input checked="" type="radio"/> C D) |
| e. Metallic cable design | (<input checked="" type="radio"/> A <input checked="" type="radio"/> B C D) |
| f. Manhole, hand hole and conduit, etc. | (<input checked="" type="radio"/> A B <input checked="" type="radio"/> C D) |
| g. Inventory control and estimation | (A <input checked="" type="radio"/> B C D) |

(7) Outside plant construction of Construction of outside ranging aerial and underground facilities and also metallic and optical fiber cable.

- a. Supervisory work
- b. Pole and guy construction.
- c. Safety control and operation of construction vehicles
- d. Optical fiber cable
- e. Metallic fiber cable
Cable Insulation
Fusion splicing
Closure assembling
- f. Tester operation and testing
- g. Manhole, Hand hole and conduit, etc.
- h. PHS-WILL system

- (X) (B) C D)
- (A) B C D)
- (A) (B) C D)
- (A) (B) C D)
- (A B) (C) D)
- (X) (B) C D)
- (A) (B) C D)
- (A) (B) C D)
- (A) (B) C D)
- (A) B (C) D)
- (A B) (C) D)

(8) Maintenance

Maintenance of outside facilities through actual field repair work and using systems.

- a. Maintenance management.
- b. Operation of testers.
- c. Emergency cable connection method.
- d. Trouble repair.
- e. Monitoring system.

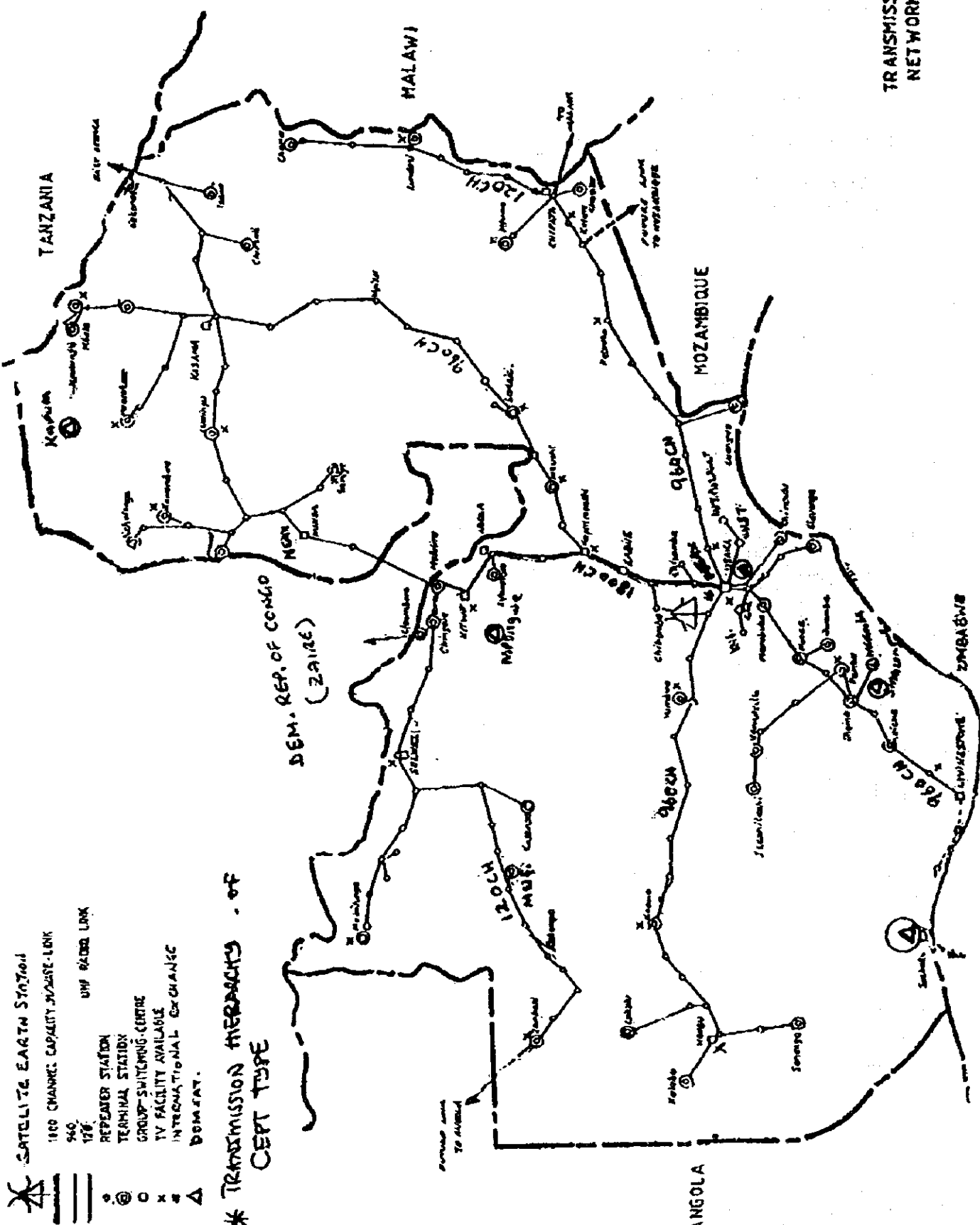
- (X) B C D)
- (A) B C D)
- (A) B C D)
- (A) B C D)
- (A) B C D)

(9) Quality control activities.

(A) B C D)

(10) Others (Observation of NTT facilities, Study tour, etc.)

(A) B C D)



- SATELLITE EARTH STATION
- 180 CHANNEL CAPACITY IN/OUT-LINK
- 960
- 120
- UHF RADIO LINK
- REPEATER STATION
- TERMINAL STATION
- GROUP SWITCHING CENTRE
- TV FACILITY AVAILABLE
- INTERNATIONAL EXCHANGE
- DOMESTIC

* TRANSMISSION CAPACITY OF
CEPT TYPE

TRANSMISSION
NETWORK

ZAMBIA TELEPHONE NETWORK

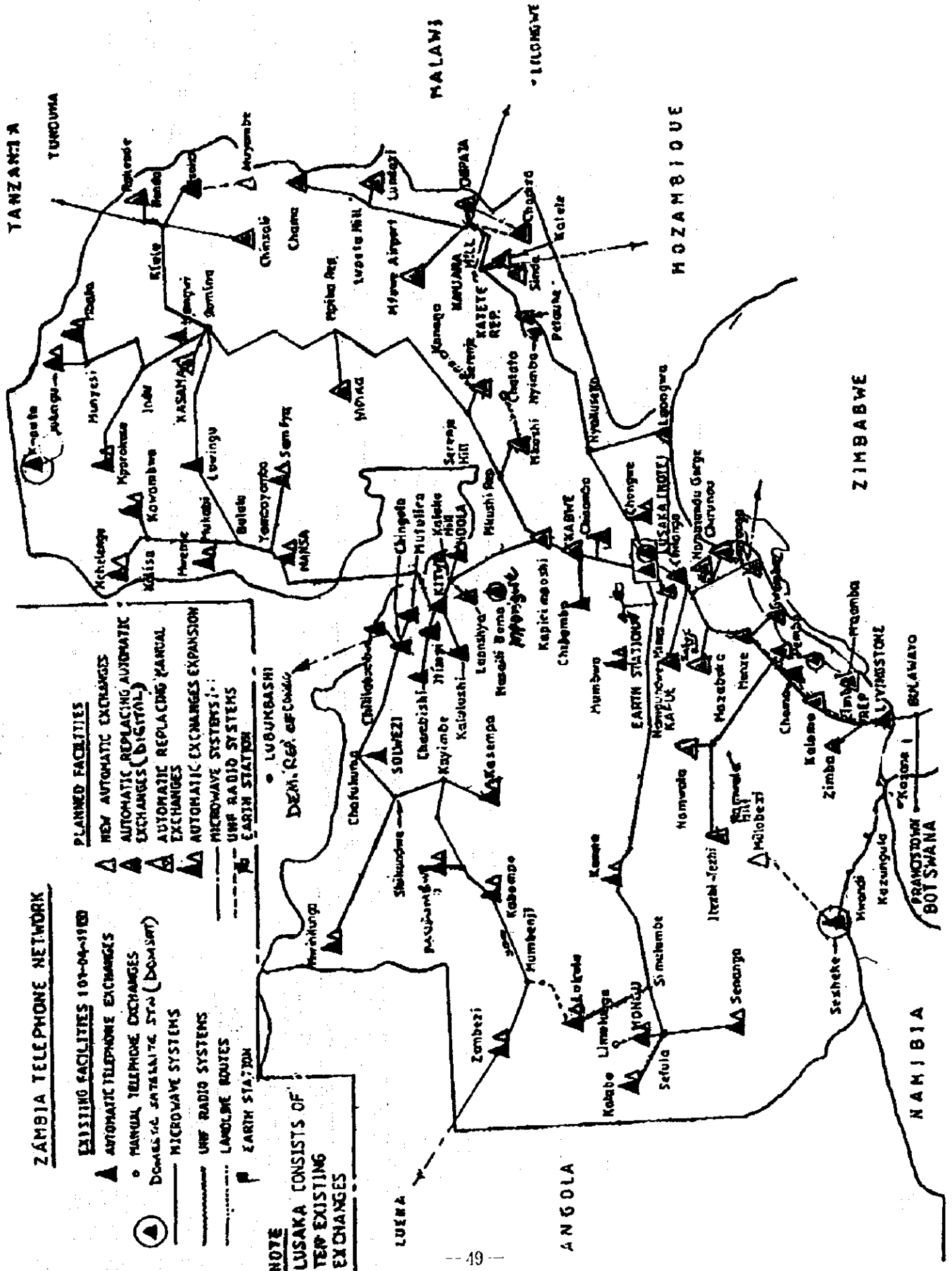
EXISTING FACILITIES 10-04-1980

- ▲ AUTOMATIC TELEPHONE EXCHANGES
- MANUAL TELEPHONE EXCHANGES
- ◉ DOMESTIC SATELLITE STA (DOMSAT)
- MICROWAVE SYSTEMS
- UHF RADIO SYSTEMS
- LANDLINE ROUTES
- ⊞ EARTH STATION

PLANNED FACILITIES

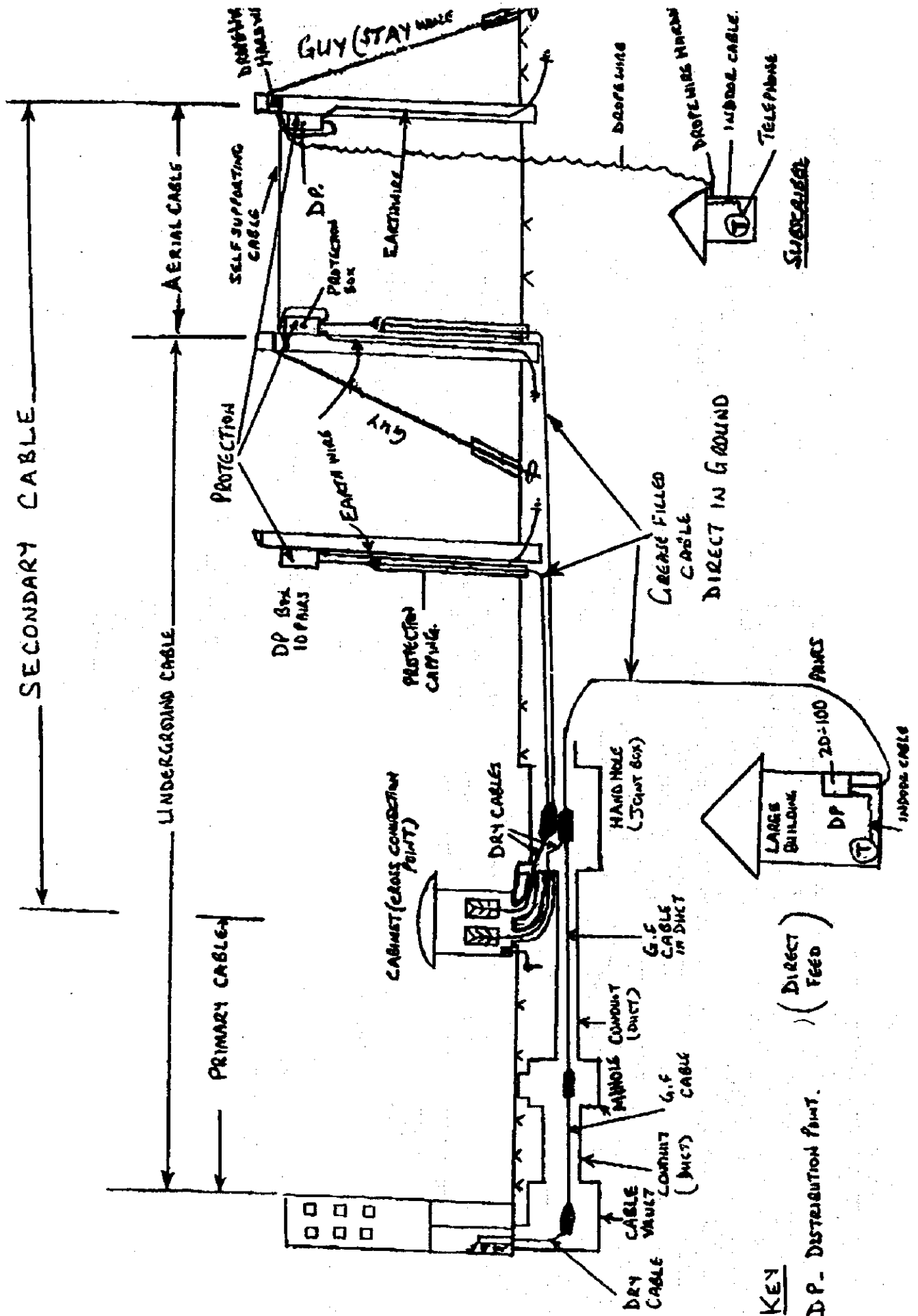
- ▲ NEW AUTOMATIC EXCHANGES
- ▲ AUTOMATIC REPLACING AUTOMATIC EXCHANGES (DIGITAL)
- ▲ AUTOMATIC REPLACING MANUAL EXCHANGES
- ▲ AUTOMATIC EXCHANGES EXPANSION
- MICROWAVE SYSTEMS
- UHF RADIO SYSTEMS
- ⊞ EARTH STATION

NOTE
LUSAKA CONSISTS OF
TEMP EXISTING
EXCHANGES



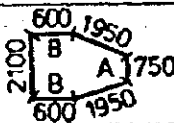
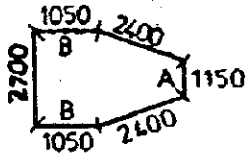
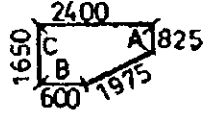
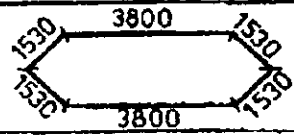
OUTLINE OF SUBSCRIBER LINE

ANNEX 2



SURFACE BURIED BOXES

MANHOLES

CODE	DRG N°	WALL THICKNESS	INTERNAL DIMENSIONS		INTERNAL DIMENSIONS	MAX N OF WAYS
JRB 1	4C-24	100	1670L	760W	690H	4
JUF 4	4B-8	85	940L	470W	625	2
JRF 10	4B-9	150	2300L	700W	1000	6
JUF 11	4B-10	150	1700L	700W	850	4
MR 1	4B-25	125	1800L	1200W	1800	5 TO 9
MR 2A	4B-26	150	3000L	1200W	1800	10 TO 32
MR 2B					1950	33 TO 36
MR 2C					2100	37 TO 40
MR 2D					2250	41 TO 44
MR 2E					2400	45 TO 48
MR 4	4B-27	125	2400L	1050W	1800	5 TO 9
MRT7	4C-28	150			1800	'A' UP TO 12 'B' UP TO 6
MRT8A	4D-29	175			1800	'A' 12 TO 24 'B' 6 TO 12
MRT8B					2100	'A' 24 TO 36 'B' 12 TO 18
MRT8C					2400	'A' OVER 36 'B' OVER 18
MRT9	4C-30	150			1800	'A' UPTO 24 'B' UPTO 18 'C' UPTO 24 B+C ≤ 25
MR 11	4C-31	175	4050L	1650W	2100	OVER 48
MRT12A	4D-40	200			2100	UP TO 48
MRT12B					2400	UP TO 48
MRT12C					2700	OVER 48
MRT12D					3000	OVER 48

NOTE WITH ALL JOINTING CHAMBERS EXCEPT JUF 4 ONE RIDER DUCT MAY BE ADDED TO MAXIMUM N° OF WAYS SHOWN

DISTRIBUTION
NIL

LIST OF STANDARD
SERIES MANHOLES
AND JOINT BOXES

2. BASIC PLANNING WORK

2-1 Fundamental Design for Long Term.

Policy : Every exchange must have a Fundamental Plan before any estimate is done. The fundamental plan is a guide to any planning project to be undertaken. The forecast is based on a twenty (20) year period.

- 2-1 (a) **General Contents** :
- (1) Name and type of exchange, date of preparation, and date of forecast.
 - (2) Size and conductor gauge of existing cable, relief and deferred cables with year required to be implemented and type of cable where it is required.
 - (3) Proposed recovery and diversion of existing cables.
 - (4) Relative position and cabinet number.
 - (5) Proposed position of deferred cabinet and year required.
 - (6) Cable code at exchange for main cable.
 - (7) Development forecast at three (3) base dates and the present figure for every cabinet, the figures being submitted along side the cable route.
 - (8) Direct Current (D.C) resistance and reference equivalent (d.B) shown adjacent to each cabinet.
 - (9) The name of thorough fares or land marks necessary to locate the plant.
 - (10) Distance to each cabinet from exchange and distance between points of change in the cable network.
 - (11) Number of existing and proposed duct.

2-1(b) Executed Projects : The following projects were executed during the period January 1998 to September 1998.

- (a) Northern :-
- Kansenshi :- Cab 3/5 D-Side cable relief
 - Cab 3/1 D-Side cable development
 - Cab 3/2 D-Side cable development
 - Cab 3/3 D-Side cable development
 - Cab 3/4 D-Side cable development
 - Primary cable to cab. 1,2,3,4,5 and 6.
 - Recovery of p.v.c duct.
 - Northrise :- Cab 2/3 D-Side cable development.
 - Pamodzi :- Cab 1/2 D-Side cable development.
 - Kitwe :- Cab 20 D-Side cable relief
 - Cab 24 D-Side cable relief
 - Cab 25 D-Side cable relief
 - Cab 33 D-Side cable relief
 - Karambe :- Cable development
 - Luanshya :- Cab 22 D-Side cable development
 - Cab 22 primary cable development
 - Cab 22 & 14 duct development.

- Southern / Lusaka :-
- Woodlands :- Duct extension to cab. 3 & 22
 - Cab. 3 & 22 Primary cable development
 - Cab. 3 D-Side cable development
 - Lusaka Main :- Duct extension to Cab 32
 - Cab 9 D-Side relief.
 - Chilanga :- Cab 1 D-Side Rehabilitation
 - E/O cable relief
 - Chelstone :- Recovery of duct and wooden poles
 - Roma :- Cab 12 D-Side cable relief
 - Chipata :- Cab 1 D-Side development
 - Chirundu :- E/O cable development
 - Sinazongwe :- E/O cable development.

(4) ON - GOING PLANNING PROJECTS

The following projects are being planned at the moment.

- Northern :-
- Ndola :- Provision of service to National Achieves Bwana Mkubwa.
 - Provision of service to new residential area Hillcrest
 - Inspection of condition of joint boxes, covers and joints.
 - Kitwe :- Scrutinizing wires and establishing cause of not providing service.
 - Cable rehabilitation E-Side to Cabinets 36,38,39,40 and 41.

- Southern :-
- Woodlands :- Cab 14 sub division
 - Cab 14 D-Side cable relief
 - Cab 15 D-Side cable relief
 - Cab 18 D-Side cable relief
 - Cab 26 D-Side cable relief.
 - Ridgeway :- Cab 23 D-Side cable relief
 - Lusaka :- Provision of service to Titus of Zambia

- Provision of service to First Merchant Bank.
- Makeni -: Provision of service to Chawama
- Chinika -: Provision of service to Bonnita
- Roma -: Provision of P.C.O. to Mashlands.
- Emmendale -: Provision of service to Zambia Bottlers.
- * Chipata -: D-Side Cable development (Cab 5)

(5) PLANNED PROJECTS -: The following projects are planned and awaiting execution.

- Northern -:
- Ndola -: Duct extension to various Cabinets
Primary cable to the cabinets
Secondary cable to the cabinets
 - Kitwe -: Duct extension to various Cabinets
Primary cable to the cabinets
Secondary cable to the cabinets
 - Mufulira -: Duct extension to various Cabinets
Primary cable to the cabinets
Secondary cable to the cabinets
 - Chilabombwo -: Duct extension to various Cabinets
Primary cable to the cabinets
Secondary cable to the cabinets
 - Mansa -: Duct extension to various Cabinets
Primary cable to the cabinets
Secondary cable to the cabinets

- Southern / Lusaka -: Lusaka Region -:
- Duct extension to various Cabinets
Primary cable to the cabinets
Secondary cable to the cabinets
 - Chipata -: Duct extension to various Cabinets
Primary cable to the cabinets
Secondary cable to the cabinets
 - L/Stone -: Duct extension to various Cabinets
Primary cable to the cabinets
Secondary cable to the cabinets
 - Mungu -: Duct extension to various Cabinets
Primary cable to the cabinets
Secondary cable to the cabinets
 - Mazabuka -: Duct extension to various Cabinets
Primary cable to the cabinets
Secondary cable to the cabinets

These are just a few to mention.

* 2-2 Demand Forecasting

(1) Method of demand forecasting -: The marketing department should always have updated forecasts for all exchanges. Demand for telephones can be obtained by use of data extracted from previous forecast reports for each respective exchange of any particular area in question.

The method of demand forecasting is as follows -:

- (a) Exchange area survey.
- (b) Demographic counting
- (c) Physical observation
- (d) Desk research (where forecast is still valid)
- (e) Tenancy counting.
- (f) projected growth through extrapolation

(2) Policy. -: The company policy on forecast's, is that every exchange must have a valid forecast for planning purposes. Every exchange forecast must be reviewed one before the expired date. The demand forecast is based on twenty years in five year base rates.

(3) Micro demand forecasting in nationwide.

	1998	1999	2000	2001	2002
Nationwide	77,377	78,924	80,503	82,113	83,755
Telephone Density	0.80	0.80	0.80	0.80	0.80

Note: The figures for nationwide are based on 2% growth rate per year.

2-3 Facility Planning for long term and last year

(1) Investment plan in telecommunication facilities and equipment

	1998	1999	2000	2001	2002
Investment amounts	US\$ 1.2m	US\$ 1.3m	US\$ 1.4m	US\$ 1.6m	US\$ 1.8m
Project name	Minsundu cable development	External Projects Lusaka, Ndola, Kitwe	Ditto	Ditto	Ditto
Project Contents	cables, poles and D.P network & Cabinet 5				

Note: The investment amounts shown above are based on cable wires procurement prices in each year.

(2) Introduced plan for optical fiber cable on Access Cable Network. -: Not applicable

(3) Consultant company and /or supporting carriers. -: Not Applicable

(4) Work flow or procedure for basic design of telecommunication outside plant
(See attached Flow Chart)

ANSWER TO THE QUESTIONNIRE
ON
TELECOMMUNICATION OUTSIDE PLANT
CONSTRUCTION AND MAINTENANCE TECHNIQUES
IN
ETHIOPIA

from OCTOBER 3, 1998 to OCTOBER 17, 1998

JAPAN INTERNATIONAL COOPERATION AGENCY(JICA)
NIPPON TELEGRAPH AND TELEPHONE CORPORATION(NTT)

1.Introduction

Japan International Cooperation Agency (JICA) will conduct telecommunication outside plant training course specially offered to African countries in 1999.

In order to make the training course in Japan most appropriate and effective to the participants from African countries, JICA decided to send a field survey team to Zambia and Ethiopia.

Based on the results of the field survey, JICA will review the existing general training course in the field of outside plant engineering and will be able to make the new training course more beneficial to the African countries.

2.Purpose of the field survey

The purpose of the field survey is to identify the real needs of the training course/curriculum.The field survey team will conduct the following activities to achieve the purpose.

(1) to collect information and/or data concerning the following main points.

- a General information on the current situation of telecommunication sector.
- b Basic requirements and priority for training course/curriculum in Japan.
- c Necessary improvements and unsolved problems in the outside plant planning, construction, operation and maintenance.
- d Future plan of support system for the outside plant.

(2) to survey the condition of existing outside plant, such as duct, cables, manholes, etc.

(3) to survey the way of installation of outside plant.

(4) to hold meetings with managers and staffs concerning the Questionnaire*.

It will be greatly appreciated if the answers to the Questionnaire will be given to the field survey team.

* Note: The Questionnaire (ANNEX) will be processed only for the improvement of future JICA training curriculums and will not be used for any other purposes.

3. Members of the field survey team

The members of the field survey team are as follows;

Team Leader: Mr. Shigemaro Aoki, Development Specialist, JICA

Team Member: Mr. Takashi Matsumoto, Training Officer, JICA Kyushu International Centre

4. Proposed itinerary of the field survey team

Proposed itinerary of the field survey team is as attached;

5. Items requested by the field survey team to the Governments of Zambia and Ethiopia

The Governments of Zambia and Ethiopia are kindly requested to provide the following assistance to the JICA field survey team for a smooth implementation of the survey.

(1) To provide the field survey team with available relevant data, information and materials necessary for the smooth implementation of the survey.

(2) To prepare the answers for the Questionnaire presented by the survey team.

(3) To assign full time counterpart to the team during their stay in Zambia/Ethiopia to play the following roles as a coordinator to the team.

- to make the appointments and set up the meeting with authorities concerned whatever

the field survey team intended to visit,

- to attend the site survey and any other visiting place with the team.
- to assist and advice the team for their collection of data and information as much as possible.

(3) To take any necessary measures deemed necessary to secure the safety of the member of the team.

ANNEX: QUESTIONNAIRE;

Part-1: Information on outside plant work and relevant circumstances

Part-2: Priority on outside plant training curriculums

ANNEX: QUESTIONNAIRE;

Part-1: Information on outside plant work and relevant Circumstances

1-1 Identity

(1) Date: *Oct15, 1998*

(1) Name and Position: *Retta Dessie, Division manager for OSP*

(2) Name of the organization: *Ethiopian Telecommunication Corporation*

1-2 Organization

(1) Name of Organization: *Ethiopian Telecommunication Corporation*

(2) Organization Diagram: *Annexed*

(3) Number of employees in each section: *Annexed*

(4) Main business and works contents in each section

(5) Locations: *Head office*

(6) Income and Budgets:

Income: 1996/1997: Birr 551, 800, 000

1997/1998: Birr 584, 130, 000

Budget: 1997/1998: Birr 763, 925, 000

1998/1999: Birr 784, 317,000

1-3 Present Telecommunication service status

(1) Telephone service: *As of Dec 1997*

Total Number of telephone sets in nationwide	<i>185, 811</i>
Total Number of corporate subscribers	<i>160, 269</i>
Total Number of residential subscribers	<i>98, 717</i>
Number of telephone lines per 100 subscriber	<i>0.3</i>
Total Number of public telephone sets (Coin/Card phone)	<i>1, 009</i>
Number of waiting customer and/or telephone line	<i>214, 258</i>
Trouble rate of telephone set or subscriber line per 100 people , and per month	<i>17</i>
Ratio of digital switch or subscriber line	<i>37.7%</i>

(2) Other telephone service

Total Number of ISDN line	-
Total Number of Data communication service per transmission speed	2300 Internet subscribers/28.8kb/s
Total number of leased line	90
Total number of mobile phone	-

1-4 Network Configuration:

(1) Nationwide network structures: *Annexed.*

(2) Transmission network diagram: *Annexed.*

(3) Primary/Secondary cable diagram/method for line distribution: *Primary cable map, primary jointing plan, Secondary cable map & Secondary Jointing plan are annexed.*

1-5 Facility situation of Outside Plant Network

Outside Plant		Type	Kind of structure	Total cable Length or totals	Manufacturer	
Cable	Primary Cable	Aerial	<i>Paper, Plastic</i>	<i>Armoured</i>	<i>Not Available</i>	<i>Various</i>
		Direct Buried	<i>Paper, Plastic</i>	<i>Unarmoured</i>	<i>Not Available</i>	<i>Various</i>
		Duct			<i>Not Available</i>	<i>Various</i>
	Secondary cable	Aerial	<i>PE Insulated</i>	<i>Fig 8</i>	<i>Not Available</i>	<i>Various</i>
		Direct Buried	<i>Paper, PE</i>	<i>Armoured</i>	<i>Not Available</i>	<i>Various</i>
		Duct	<i>Paper, PE</i>	<i>Unarmoured</i>	<i>Not Available</i>	<i>Various</i>
	Fiber Local Cable	-	-	-	-	
	Metal Toll Cable	-	-	-	-	
	Metal junction Cable	<i>Paper, PE</i>	<i>Arm/Unarm</i>	<i>Not Available</i>	<i>Various</i>	
	Optical Fiber Junction Cable	<i>Multi/Single</i>	<i>Arm/Unarm</i>	<i>10Km/55Km</i>	<i>NEC, Siemens</i>	
Pole	Wooden pole	<i>7m,8m,9m,10m</i>	<i>Eucalyptus</i>	<i>Thousands of PCs.</i>	<i>Local</i>	
	Steel pole	-	-	-	-	
	Concrete pole	-	-	-	-	
Cabinet		<i>Sheet metal cover(old Type)</i>	<i>1200p/1800p</i>	<i>Hundreds of PCs</i>	<i>Local</i>	
DP (Distribution point)		<i>Indoor/Outdoor</i>	<i>10p/10-100p</i>	<i>Not Available</i>	<i>Local/Foreign</i>	
Manhole	Telephone tunnel					
	Manhole	<i>Concrete</i>	<i>S,L,T,X</i>	-	<i>Local</i>	
	Handhole	<i>Concrete</i>	<i>Simple</i>	-	<i>Local</i>	
Duct		<i>Concrete/PVC</i>	<i>100mm dia.,1m/100m m dia.,6m.</i>	-	<i>Local/Foreign</i>	
Wire dropping		<i>Bronze/Cu cover steel</i>	<i>One pair</i>	-	<i>Various</i>	
Safety Application	Protector	<i>Fuse/GDT</i>	-	-	<i>Various</i>	
	Earth	<i>Copper Plate</i>	<i>rectangle</i>	-	<i>Various</i>	
	Earth device	<i>Grounding Pole</i>		-	<i>Various</i>	
Customer equipment premises		<i>Tele.set, Fax,PC,Telex</i>			<i>Various</i>	

1-6 Training courses

- (1) Name of training courses
- (2) Duration
- (3) Number of trainees in each course
- (4) Number of outside plant Instructors

ETC's training division has provided the answers to these questions

2 Basic Planning Work

2-1 Fundamental Design for long term

- (1) Policy ____
- (2) General contents ____
- (3) Executed projects: *In Addis Ababa and other towns of Ethiopia*
- (4) On-going projects: *In Addis Ababa and other towns of Ethiopia*
- (5) Planing projects: *In Addis Ababa and other towns of Ethiopia*

2-2 demand forecasting

- (1) method of demand forecasting: *ETC generally applies linear trend (a+bt)*
- (2) policy
- (3) macro demand forecasting in nation wide

	1998	1999	2000	2001	2002
Nationwide					
Telephone density	0.3			1	

2-3 facility planning for long term and last year

- (1) Investment plan in telecommunication facilities and equipment

	1998	1999	2000	2001	2002
Investment amounts	763,925,000	784,317,000	500,000,000		
Project name	<i>Outside plant, switching, transmission, civil works, power</i>				
Project contents					

- (2) Introduced plan for optical fiber cable on access cable network: *ETC has not optical fiber in its access network, however we are using optical fiber as a junction network between exchanges. In the near future we will use it in the access.*
- (3) Consultant company and/or supporting carriers: *No*
- (4) work flow or procedure for basic design of telecommunication outside plant
 - *Gathering of information from inside and out side of ETC*
 - *After having the existing subscribers, waiting subscribers and demand forecast information and data ANALYSING, population growth, demography, geographic situation, business activities, data on other service giving authorities. These data are analyzed carefully.*
 - *Field survey, designing, cost estimate for the preparation of project proposal and then works order is issued consequent construction work.*

3 Construction work

3-1 Organization system for Outside plant construction Group/section

Deputy Zone/Regional manager for OSP - Team Leader for Maintenance/ Construction/ Rehabilitation - Senior Forman - Foreman - OSP Lineman/Jointers

(1) Construction cost: *per line cost for OSP construction is USD 250-300 including material*

(2) Construction project classification (expansion or rehabilitation) : *OSP Expansion project / OSP Rehabilitation / OSP Maintenance*

(3) Construction site: *The construction of OSP network projects during the on going 7th development program is being held extensively in Addis Ababa and other telecom regions of Ethiopia at an estimate cost of Birr 1,000,000,000.*

3-2 Demarcation of Order for construction work

	Ratio	Demarcation	Project cost
Direct management of construction			
Out side supplier for construction			

Currently ETC is practicing OSP Construction work by its own manpower, however, it is planning to utilize local and foreign contractors in the future.

3-3 Manuals and documentation for outside plant designing/construction/material/inspection standard

	Yes/ No	Established year	Remarks
Local cable or access network cable	<i>Yes</i>	<i>1994/1995</i>	
Metal junction cable network	<i>No</i>		
Optical fiber cable network			
Underground cable network	<i>Yes</i>	<i>1994/1995</i>	
Wireless local loop network	<i>No</i>		
Outside equipment (cabinet and DP)	<i>Yes</i>		
Others			

3-4 Work procedure or cycle for detailed design of outside plant : Demand forecasting -> Detail Design -> Computation of manpower and materials -> estimate of contract cost -> Bid/tender -> Evaluation -> Contract: *OK. At present ETC is not practicing OSP contract work. It is implementing OSP construction work by its own employees.*

4 Control and management of implementation work: *To control the construction of OSP works ETC prepares an implementation schedule and it reviews the positive aspects and constraints for improvement.*

4-1 Supervision of implementation work: *The supervision is made by Team Leaders and Supervisors*

- (1) Implementation schedule: *ETC prepares implementation schedule manually using bar chart*
- (2) Implementation cost: *The cost is covered by ETC and multilateral organizations*
- (3) Work force of implementation work: *the work force for implementation is from ETC and daily work*
- (4) Change order: *If there is a need for change of works order it is performed using ETC's procedures*

4-2 Inspection of constructed facilities including network configuration

- (1) Principle of sampling test: *continuity test is made 100%, insulation resistance test is made on sample basis, say 10%*
- (2) Standard judgement of quality: *The insulation resistance, capacitance unbalance and other important indicators shall be measured*
- (3) Others: *Visual inspection is made in the construction site, Care shall be taken during preparing technical specification and procurement*

4-3 Control of safety in construction work

- (1) Policy: *The safety of the construction personnel during construction is required.*
- (2) Preventive maintenance: *Preventive maintenance is important but ETC lacks experience*
- (3) Others

4-4 Hand-over "Constructed facilities" from implementation group to operation and maintenance group

- (1) Policy: *It is usual practice in ETC*
- (2) Work procedures: *construction group will present tested document, operation group will check and report. If there is a mismatch, construction group is advised to rectify the mismatch and the line would be ready for sale.*
- (3) Work demarcation
- (4) Others

5 Operation and maintenance work

5-1 organization system for operation and maintenance group/section

(1) OPMC (Outside Plant Maintenance Center): *available as corrective maintenance team in exchange area*

(2) Work demarcation and work contents: *corrective activities to clear the occurred cable and line fault*

(3) Others: *preventive maintenance activity is in its initial stage, i.e. under implementation*

5-2 Work order and service order

(1) Daily number of work order in one OPMC

Work order: New connection, Change facility and disconnection: *(as of Sep 98)*

Section	New connection	Change facility	Disconnection	remarks
Switch (MDF)	<i>30/group/week</i>		<i>35/week</i>	
Primary cable	<i>30/group/week</i>			
Cabinet	<i>30/group/week</i>			
Secondary cable	<i>30/group/week</i>			
DP	<i>30/group/week</i>			
Subscriber premises	<i>30/group/week</i>			

5-3 Procedure of Work order processing from applicant until line activation

Applicant -> Order distribution -> assignment of facility -> assignment of work schedule and work force -> dispatch -> Line activation: *All OK*

As ETC has relatively huge number of waiting applicants, if there is no OSP infrastructure, the applicant will be in the waiting list and when the infrastructure is ready this applicant will have priority when compared with late applicants. Then after he/she will be communicated to pay the connection fee, then he/she will sign a contract form and service order is issued for consequent connection

5-4 Service life of communication facilities

	Year	Judgement	Remarks
Underground cable (Metal)	20-30	General practice	-
Aerial cable (Metal)	10-15	General practice	-
Cabinet and DP	10-15	General practice	-
Telephone pole	10-15	General practice	-
Protector	5-10	General practice	-
Manhole and Handhole	30-40	General practice	-
Duct or conduit line	30-40	General practice	-
Others	-	-	-

6 Facility fault repair work

6-1 Large scale fault prevention measure (Optical fiber, Metal cable and Junction cable and system)

(1) Manual and/or standard document: *NO*

(2) Policy and Organization: *NO*

(3) A past accident case and handled processing: *NO*

(4) Average of the time required for large scale fault recovery per class: *NO*

6-2 Work flow for fault repair processes of subscriber line (Access network)

(1) Standard procedures

Acceptance -> test of initial line condition -> judgement -> create work order -> dispatch -

>Restoration -> Report and analysis: *All except 'create work order' are OK*

(2) Operation manual: *NO*

(3) Work demarcation : *YES*

(4) Reporting: *YES*

(5) Analysis and feed-back: *YES*

6-3 Failure rate per 100 subscriber line/ telephone number and in monthly

Section	Current Rate	Target rate	Ideal rate
Total access network	<i>16.67</i>	<i>9.8</i>	<i>2.08</i>
Primary side	<i>0.58</i>	<i>0.35</i>	
Secondary side	<i>1.36</i>	<i>0.95</i>	
Drop wire and protector	<i>8.97</i>	<i>5.27</i>	
Subscriber premises equipment	<i>1.73</i>	<i>1.01</i>	
Telephone set	<i>1.23</i>	<i>0.72</i>	
Others	<i>2.8</i>	-	

6-4 Average of the time required for fault recovery

Section	Current time duration	Target time duration
Cable network	<i>9 days</i>	<i>3 days</i>
Telephone equipment	<i>1 day</i>	<i>1 day</i>
Subscriber premise equipment	<i>1.5 days</i>	<i>1 day</i>

6-5 Countermeasure for improvement of outside plant facilities

(1) statistic analysis for fault repair work

By Cause

By Repair method

By fault point or section -> *Primary, Secondary, Drop wire, Apparatus, DP, Subscriber premises*

By constructed year

By area such as DP, cabinet and exchange

(2) Feed-back to designing and planning section -> *to be organized using database*

Replacement

Others

7 Measurement tools

7-1 Metal Cable

Subscriber line test equipment: *available in MDF*

Measurement and search tool for fault point on metal cable (underground and aerial cable). *Pulse - echo Cable fault locators and cable finders are in use in maintenance activities.*

Digital checker for subscriber in-house wire: *ETC is using Digital echo pulse meter for fault locating, Insulation testers, Pair Identifiers, Field telephone set, head set, cable locator.*

7-2 Optical Fiber Cable

Optical power tester: *NO*

Optical Time Domain Reflectometer (OTDR): *NO*

Optical Fiber Continuity Test equipment: *No, however we have few fusion splicers*

7-3 Management System for Optical Fiber Cable

Automatic Optical operation Support system: *NO*

Fiber transfer and Test System: *Not Available*

8 Facility Management System

8-1 Management of Access Network Information

- (1) MDF (Main Distribution Frame): *MDF Record*
- (2) Primary cable pair: *Record in primary Jointing Plan*
- (3) Cabinet: *recorded in CCC No.*
- (4) Secondary cable pair: *recorded in secondary Jointing Plan*
- (5) DP: *Recorded in Jointing plan by terminal No.*
- (6) Subscriber premises: *In subscriber card*

8-2 Customer Information Management

- (1) Customer Address and other application information
- (2) Customer name and telephone Number
- (3) Work order Information
- (4) Assigned facility information
- (5) Fault, trouble and complain information

} *Recorded in
subscriber card*

8-3 Facility location and capacity Management based on geographical map

- (1) Location map
- (2) Diagram
- (3) Part map

(Sample)

Management System	Yes or No	System Name	System Configuration	Database	Applied date

No computerized management systems exist.

9 Others

9-1 Which skills of telecommunication technology do you and your company want to acquire?

- *Current access network technology (copper based)*
- *Optical Fiber technology*
- *Wire-Less Local Loop system*

9-2 What do you want to improve your current telecommunication work and business?

- *Digitization of ETC's Network*
- *Modern management with vision*
- *Man power development*

9-3 Which programs do you have an interest in?

For the Outside plant network training the construction and maintenance of copper based and optical fiber cables.

9-4 How are you going to put this training to your future practical use?

- *After the completion of the OSP training the trainee should be able to plan, design, construct and maintain OSP cable network.*
- *He should be conversant with the current engineering and management of OSP cable network practices, with great interest in the evolution of OSP networks*
- *He should train ETC's staff regarding the knowledge gained in Japan.*
- *He should be able to understand the new ideas on access network philosophy.*

ANNEX: QUESTIONNAIRE;

Part-2: Priority on outside plant training curriculums.

Please mark the grade of priority (A: very high, B: high, C: normal, D: low) on each item to be covered in the course.

- (1) Planning for facility investment (A) B C D)
- (2) New technologies for outside plant such as optical fiber, etc. (A) B C D)
- (3) New technologies for outside plant such as PHS-WLL, etc. (A) B C D)
- (4) Maintenance management for outside plant (A) B C D)
- (5) Operation, monitoring and emergency measures for outside plant (A) B C D)
- (6) Skills for maintaining plants and detecting and repairing faults. (A) B C D)
- (7) Actions to be taken to improve the service quality. (A) B C D)

- (8) Outside plant designing
Knowledge and skills of telecommunication access network designing. (A) B C D)
 - a Basic design (A) B C D)
 - b Detailed design (A) B C D)
 - c Demand forecast (A) B C D)
 - d Optical fiber design (A) B C D)
 - e metallic cable design (A) B C D)
 - f Manhole, hand hole and conduit, etc. (A) B C D)
 - g Inventory control and estimation (A) B C D)

(9) Outside plant construction

Construction of outside plant ranging aerial and underground facilities and also metallic and optical fiber cable.

(A) B C D)

a Supervisory work

(A) B C D)

b Pole and guy construction

(A B (C) D)

c Safety control and operation of construction vehicles.

(A (B) C D)

d Optical fiber cable

(A) B C D)

Cable installation

(A) B C D)

Fusion splicing

(A) B C D)

Closure assembling

(A) B C D)

e Metallic cable

(A (B) C D)

Cable installation

(A (B) C D)

Splicing

(A (B) C D)

Closure assembling

(A (B) C D)

f Tester operation and testing

(A) B C D)

g Manhole, hand hole and conduit, etc.

(A B (C) D)

h PHS-WLL system

(A B (C) D)

(10) Maintenance

(A) B C D)

Maintenance of outside facilities through actual field repair work and using systems.

a Maintenance management

(A) B C D)

b Operation of testers

(A) B C D)

c Emergency cable connection method

(A) B C D)

d Trouble repair

(A) B C D)

e Monitoring system

(A) B C D)

(11) Quality control activities

(A) B C D)

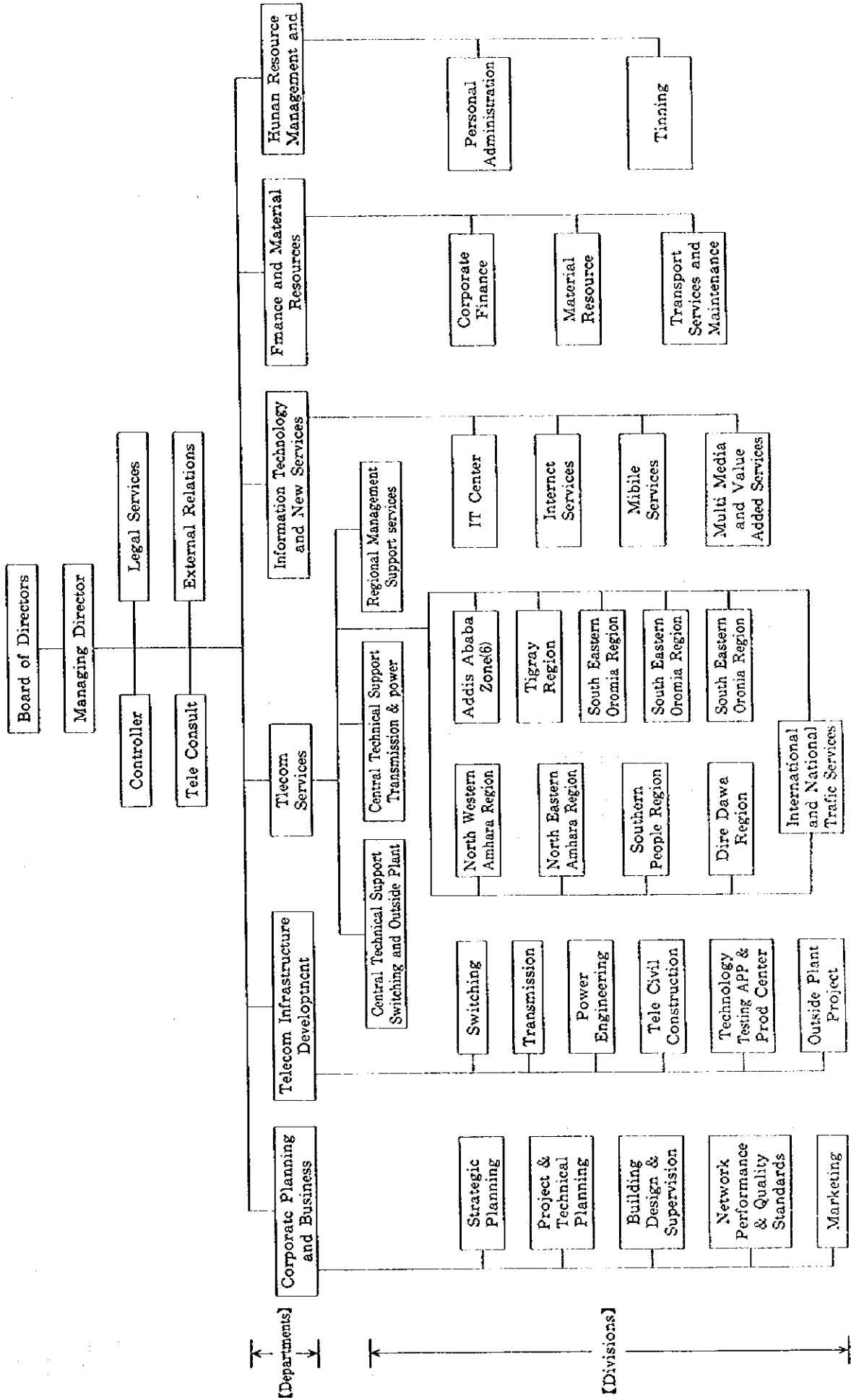
experience in NTT, Japan

(12) Others(Observation of NTT facilities, Study tour, etc.)

(A) B C D)

Thank you very much for your cooperation.

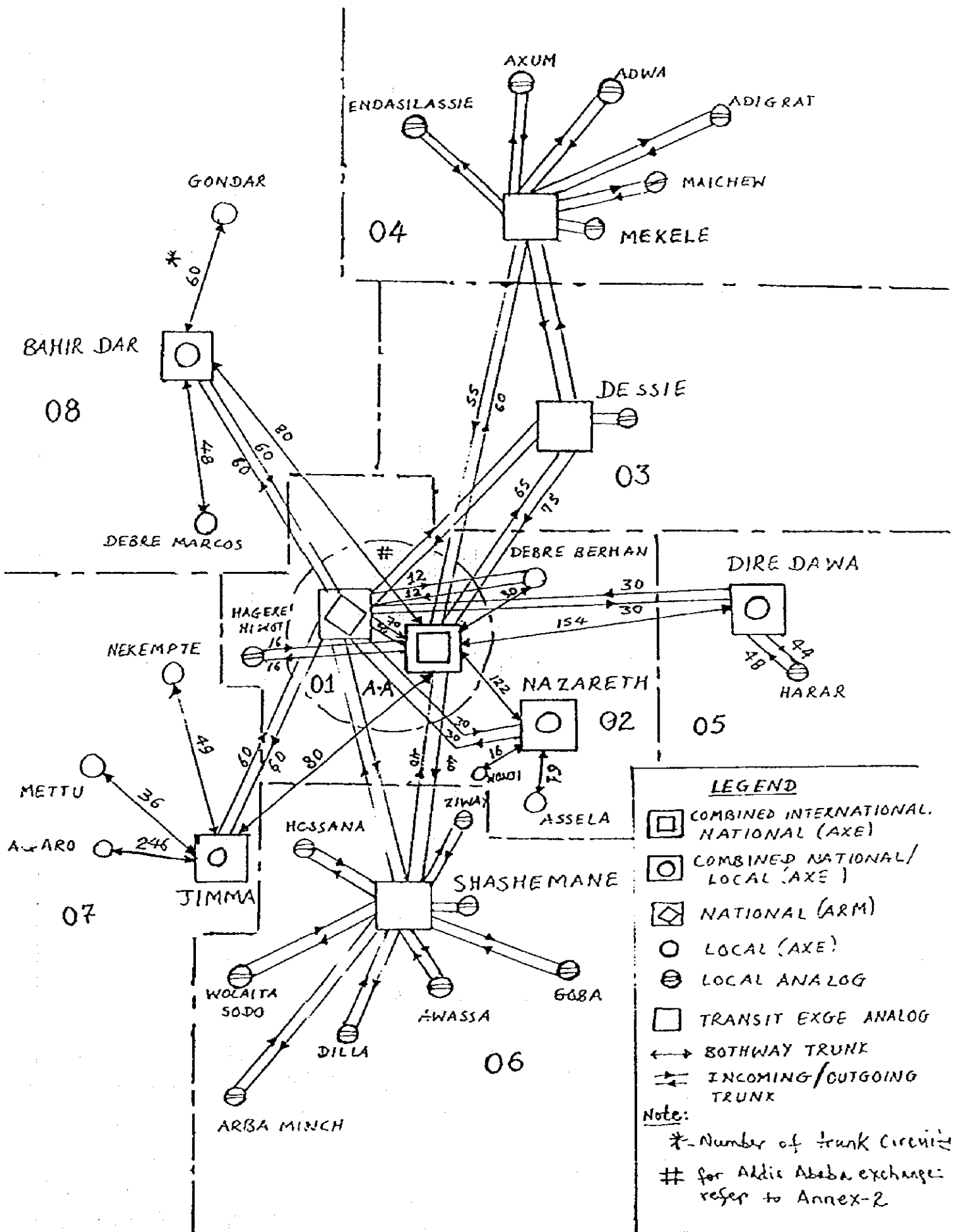
Ethiopian Telecommunication Corporation Organization Chain

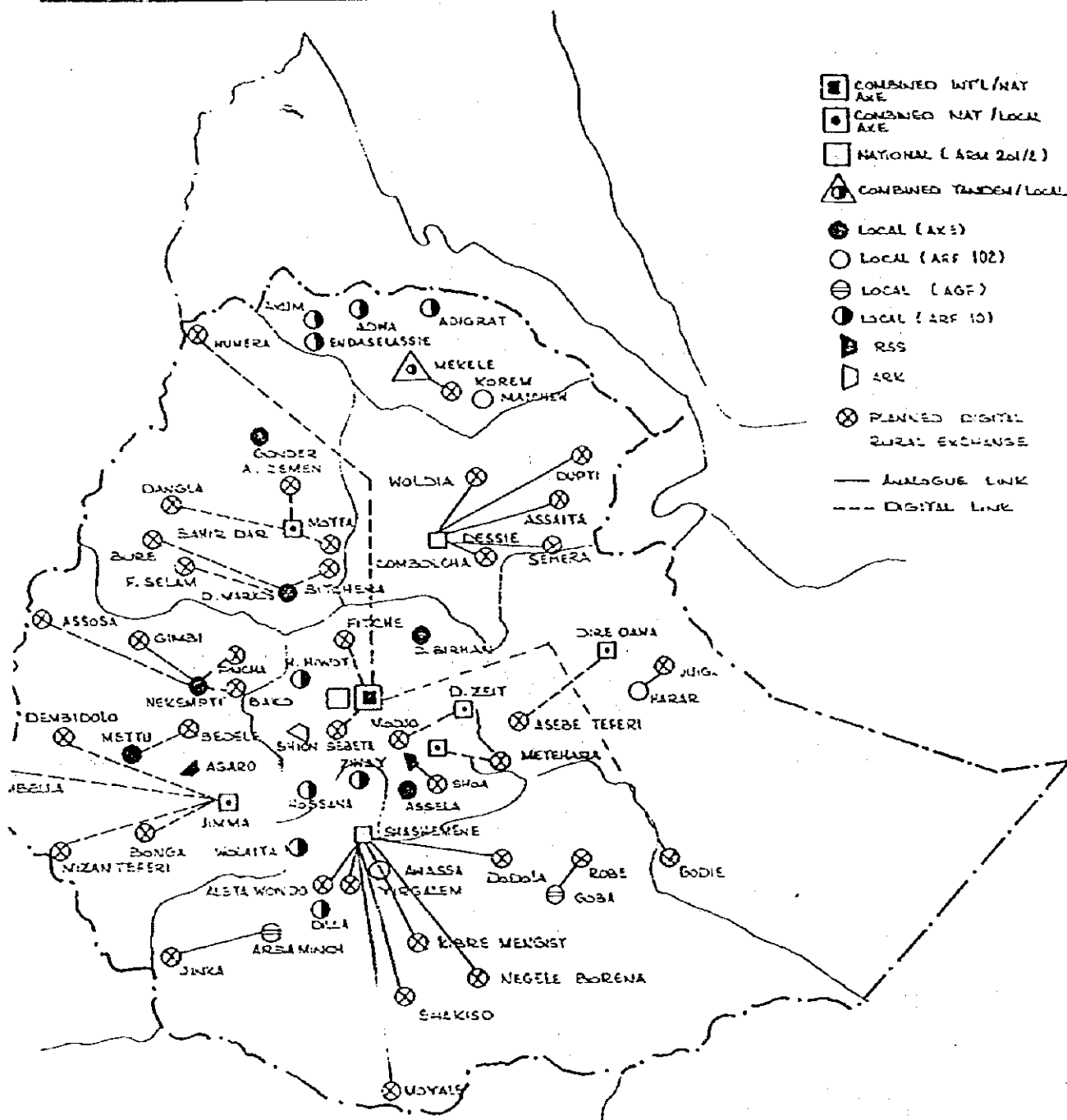


**Ethiopian Telecommunication Manpower in Corporate Level
and in outside Plant**

Professional	No. of Employees
<i>Corporate Level</i>	
Administrative	603
Financial	458
Supply	94
General service	393
Technical	1674
Traffic	1703
Special Skills	694
<i>Outside Plant</i>	
Div. Manager	1
D/Div, Zone, Region Manager	16
Team Leader	38
Engineer	10
Sen. Forman	9
Line Forman	10
Cable Forman	10
Sen. Lineman	59
Sen. Cable Jointer	26
Lineman	342
Cable Jointer	128
Jun. Lineman	62
Jun. Cable Jointer	252
Head Planner	4
Sen. Planner	6
Planner	15
Jun. Planner	40

NATIONAL ROUTING PLAN


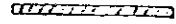



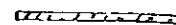
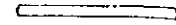



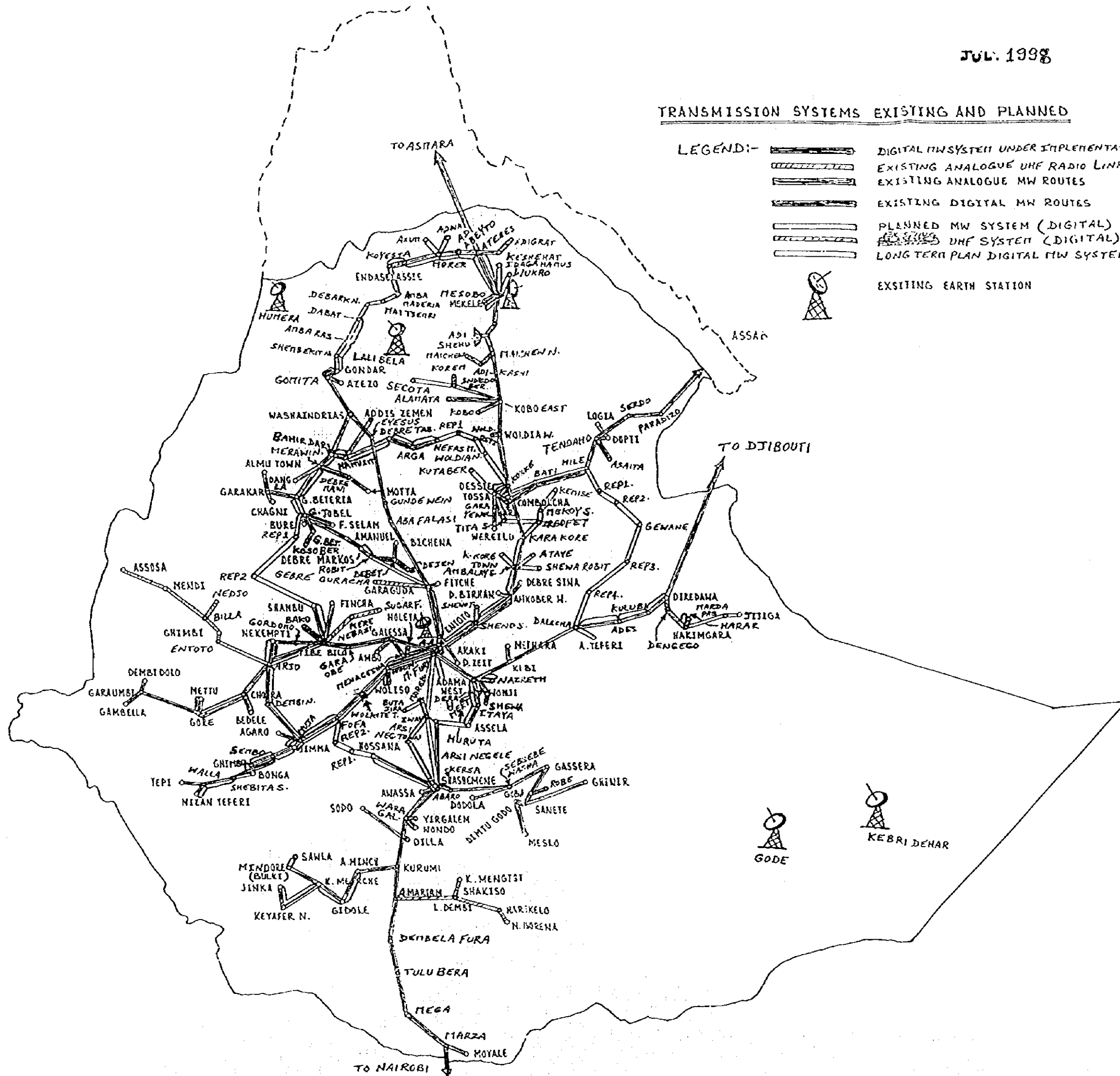


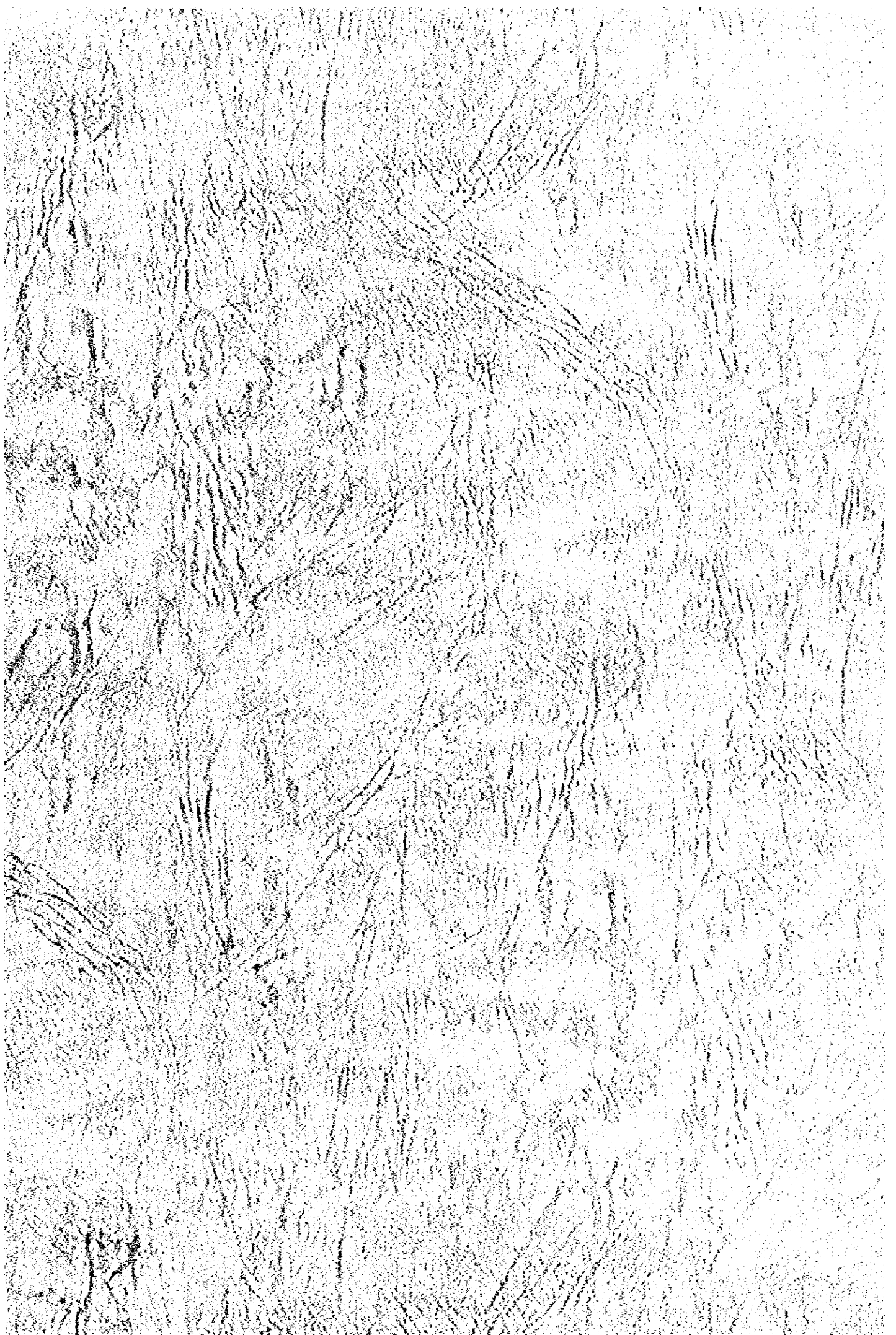
NATIONAL ROUTING PLAN

JUL. 1998

TRANSMISSION SYSTEMS EXISTING AND PLANNED

- LEGEND:-
-  DIGITAL MW SYSTEM UNDER IMPLEMENTATION
 -  EXISTING ANALOGUE UHF RADIO LINK
 -  EXISTING ANALOGUE MW ROUTES
 -  EXISTING DIGITAL MW ROUTES
 -  PLANNED MW SYSTEM (DIGITAL)
 -  PLANNED UHF SYSTEM (DIGITAL)
 -  LONG TERM PLAN DIGITAL MW SYSTEM
-  EXISTING EARTH STATION





JICA