

CHAPTER 7 EVALUATION OF THE PROJECT

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The Egyptian government has established elevation of productivity and product quality as one of the basic aims of its second five-year plan to strengthen export competitiveness and reduce imports, in order to secure development funds for the country, and to promote the policy of absorbing increasing labor force. As one concrete step, the government is providing instruction for reeducation and retraining of industry employees in more suitable methods.

The Ministry of Transport, Communications and Maritime Transport decided to expand National Telecommunication Institute (NTI), which was established in 1983 under Presidential Decree No. 193, in order to develop core engineers to become the leaders in construction and maintenance of the country's telecommunications network, which is now making great strides towards modernization through the execution of the first five-year plan and the following second five-year plan, as well as to raise the level of technology in domestic telecommunications. The ministry was allocated a total budget of L.E. 7,355,000 in the second five-year plan to start construction of new NTI facilities. The new building is scheduled to be completed and handed over by the end of this year (1989).

NTI's major service function is the training of superior engineers in Egypt and neighboring countries in the latest and most modern technologies, and the offering of sound advice and suitable solutions to specific problems encountered in the field by each host telecommunications organization. NTI's technical staff currently consists of 51 engineers, including ten with doctorates, and eight engineers with master's degrees. They have enough ability to provide very high-level training in the telecommunications field and their knowledge and skill is highly regarded by domestic organizations.

The fields in which the Egyptian government demands rapid education of technicians are (1) digital telecommunications technology, (2) telecommunications network planning technology, and (3) computer and software technology. Implementation of this Project calls for the establishment of telecommunications technical fundamentals and improvement of telecommunication services in Egypt, through training of engineer.

(1) Digital telecommunications technology

Currently, the Ministry of Transport, Communications and Maritime Transport is promoting a project for domestic production of a digital switching system. Once production starts, the digital switching system is expected to expand by about 200,000 terminals per year. This will promote rapid digitalization of the telecommunications network, including construction of digital transmission facilities.

Since most of the present engineers are trained in analog telecommunications engineering, smooth execution of construction, maintenance and operation of digital telecommunications facilities for provision of sound telecommunications service urgently requires reeducating those analog telecommunications engineers and developing them as digital telecommunications engineers.

The equipment to be provided for this Project, including a digital switching system, PCM multiplexers, digital microwave communications equipment and optical fiber communications equipment, enables NTI to provide hands-on training in basic digital telecommunications technology, interfacing between various equipment, testing equipment and measuring digital signals and to develop engineers with the capability of performing these tasks as required for support of digital communications systems in the field.

(2) Telecommunications network planning technology

In order to achieve the goal of 6.0 telephone subscribers per 100 population by the year 2002, the Egyptian government is expanding the telecommunications network by continuously investing in expansion and automation of exchanges and modernization of facilities by introduction of digital technology.

The most important aim of the government is construction of an efficient telecommunications network that offers the best possible service at the lowest possible amount of investment. To do that, however, it is urgently required that the current traffic structure be investigated, and also a study be conducted to determine the most suitable telephone network structure in compliance with the projected future telephone demand and development of telecommunication network digitalization.

Implementation of this Project will develop leading engineers of telecommunications network planning and enable them to provide the optimum design for the Egyptian telecommunications network so that the telecommunications services in Egypt will, in turn, be improved.

(3) Development of software technicians

With the introduction of a packet-switching system, which is scheduled to start service in May 1989, the Egyptian government expects computer applications to be extended as communication service is developed, which should stimulate economic activity.

With the execution of this Project, strengthening of NTI's capability to train software engineers and data communication engineers will contribute to the development of respective technical fields in Egypt. At the same time, it will support the stimulation of economic activity in the country.

- (4) Contribution to the development of telecommunications in neighboring countries

NTI's training course is open to neighboring Arab and African countries. Therefore, the execution of this Project will, through developing leading engineers, broadly contribute to the development of telecommunications in those Arab and African countries.

As described above, the implementation of this Project will, through the development of superior engineers in the telecommunications field, contribute to establishment of a foundation of telecommunications technology for the Arab Republic of Egypt and neighboring countries, and to the development of telecommunications service in those countries. At the same time, it will contribute to the stimulation of economic activities throughout the region.

CHAPTER 8 CONCLUSION AND RECOMMENDATIONS

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8.1 Conclusion

As the result of the Basic Design Study of the Expansion Project of the National Telecommunication Institute, the present states of telecommunications as a project background, the role and ability of NTI, the details of training programs, and the circumstances of technical support activities were defined and clarified. The evaluation of these items are stated in CHAPTER 7. With the evaluation, it is concluded that the Project is most significant for contributing to human development and establishment of technical foundation in the field of telecommunications in Egypt.

8.2 Recommendations

The following efforts on the part of Egypt are necessary for the successful completion of the Project and fruitful training activities in NTI.

- a) Construction work to be executed by NTI for the Project such as leading-in of commercial power supply, construction of partitions, installation of a raised floor in the equipment rooms, and preparation of concrete bases for the satellite receiver antenna should be completed before the installation of the equipment by the contractor.
- b) It is requested that NTI should prepare the necessary staff for assistance in equipment installation carried out by the contractor, and for inspection of building-related work, such as making cable holes in the wall.

- c) It is desirable that NTI should make efforts to participate the installation and measurement of the equipment executed by Japanese engineers in order to obtain technical knowledge and handling ways and that NTI should hold self-help training of the NTI staff regarding how to utilize the equipment after completion of the Project.
- d) It is necessary for NTI to construct two antenna towers and to install five antenna systems on the NTI building and remote transmission stations for the microwave propagation test within a year after completion of the Project.
- e) NTI should take necessary measures that the agencies and entities concerned will appoint their graduates from NTI training courses to be leading engineers to instruct other technical staff in their offices.
- f) In order to operate equipment in proper condition and stable performance, NTI should ensure the preparation of enough budget required for maintaining and managing equipment including the expense of maintenance contract for the computer system. NTI should also undertake all the necessary measures to ensure the finance for accepting foreign trainees.
- g) It is recommended that the Japanese Government should take the necessary procedure to dispatch technical experts to NTI for consultations and assistance in the transmission, the switching & traffic, and the administration department, according to the official request "Form A1" under the Japanese technical cooperation.

ANNEX

ANNEX 1

JICA Study Team Member (Basic Design Study)

(Jan. 27 - Feb. 24, 1989)

Name	Duty	Affiliated to
Akihiko MORITA	Team Leader	Official of Grant Aid Division, Economic Cooperation Bureau, Ministry of Foreign Affairs
Yoshihiko KAKINUMA	Telecommunication Training Program	Section Chief, Planning Division, Technology Assessment Section, Communications Research Laboratory, Ministry of Posts and Telecommunications
Yasuo SUZUKI	Telecommunication Equipment Plan	Development Specialist, Japan International Cooperation Agency, Institute for International Cooperation
Kaname HIRAGURI	Research, Training Plan, Network Planning	Japan Telecommunications Engineering & Consulting Service (JTEC)
Yoshiaki SHIODA	Transmission	ditto
Yasuo ISHIHARA	Switching & Traffic	ditto
Osamu OGASAWARA	Electronics	ditto
Masaji KOBAYASHI	Computer & Systems	ditto
Shigeji AOKI	Power Plant, Building	ditto
Jun SAITO	Cost Estimation	ditto

JICA Study Team Member
(Explanation of Draft Final Report)

(Apr. 19 - Apr. 30, 1989)

Name	Duty	Affiliated to
Akihiko MORITA	Team Leader	Official of Grant Aid Division, Economic Cooperation Bureau, Ministry of Foreign Affairs
Yasuo SUZUKI	Member	Development Specialist, Japan International Cooperation Agency, Institute for International Cooperation
Kaname HIRAGURI	ditto	Japan Telecommunications Engineering & Consulting Service (JTEC)
Yoshiaki SHIODA	ditto	ditto
Masaji KOBAYASHI	ditto	ditto

ANNEX 2

Study Schedule of Work in Egypt (Basic Design Study)

(Jan. 27 - Feb. 24, 1989)

Date	Contents of Activity
27 Jan (Fri)	Departure from Tokyo
28 (Sat)	Arrival in Cairo
29 (Sun)	Meeting with JICA Courtesy call to Japanese Embassy Meeting with MOIC (Ministry of International Cooperation) Meeting with ARENTO
30 (Mon)	Meeting with NTI (Explanation and discussion on the inception report)
31 (Tue)	Meeting with NTI (Training demand and plan)
1 Feb (Wed)	Meeting with NTI (Training demand) Laboratories survey New building construction site survey
2 (Thu)	Basic design survey (Departmental required equipment)
3 (Fri)	Data arrangement
4 (Sat)	Meeting with NTI on Minutes of Discussion and signing of Minutes (JICA: Mr. Morita, NTI: Dr. Bilal)
5 (Sun)	Basic design survey (Departmental required equipment) Departure of leader
6 (Mon)	Basic design survey (Departmental required equipment) Survey of ARENTO training center Interview with the staff of GUPCO
7 (Tue)	Basic design survey (Departmental required equipment)
8 (Wed)	ditto Interview with the staff of EEA
9 (Thu)	Basic design survey (Departmental required equipment) Survey of RTU Departure of Mr. Kakinuma
10 (Fri)	Data arrangement

Date	Contents of Activity
11	(Sat) Basic design survey (Departmental required equipment) Survey of Port Side exchange
12	(Sun) Basic design survey (Departmental required equipment) Survey of Misr Bank
13	(Mon) Basic design survey (Making of equipment list) Survey of Cairo University Arrival of Mr. Aoki and Mr. Saito
14	(Tue) Basic design survey (Making of equipment list) Departure of Mr. Suzuki
15	(Wed) Basic design survey (System configuration, equipment layout)
16	(Thu) Data arrangement
17	(Fri) ditto
18	(Sat) Meeting with ARENTO (Collection of data)
19	(Sun) Basic design survey (Final adjustment among all departments)
20	(Mon) Meeting with NTI (Results of basic design survey) New building detailed survey (Especially the part of roof)
21	(Tue) Meeting with ARENTO (Collection of data) Survey of Ramsis telephone office
22	(Wed) Meeting with JICA (Briefing of the results of basic design survey) Farewell to Japanese Embassy Meeting with MOIC (Briefing of the results of basic design survey and farewell)
23	(Thu) Meeting with NTI (Explanation of the results of the basic survey and farewell) Departure from Cairo
24	(Fri) Arrival in Tokyo

Study Schedule of Work in Egypt
(Explanation of Draft Final Report)

(Apr. 19 - Apr. 30, 1989)

Date	Contents of Activity
19 Apr (Wed)	Departure from Tokyo
20 (Thu)	Arrival in Cairo Meeting with JICA (Draft final report explanation, schedule adjustment) Courtesy call to Japanese Embassy Meeting with NTI (Hand over of draft final report) Meeting with MOIC (Ministry of International Cooperation)
21 (Fri)	Data arrangement, team member meeting
22 (Sat)	Explanation of draft final report to NTI
23 (San)	Meeting with NTI (Foreign trainees acceptance funds, network design system)
24 (Mon)	Meeting with NTI (Condition on computer system procurement)
25 (Tue)	National holiday Preparation of minutes
26 (Wed)	Meeting with NTI (Condition on computer system procurement, study on a draft of minutes) Meeting with ARENTO (Network design system, Mr. Sourì and Mr. Dokki)
27 (Thu)	Signing of minutes of discussions Farewell to JICA, MOIC and Japanese Embassy
28 (Fri)	Departure from Cairo (Arrival in Frankfurt)
29 (Sat)	Departure from Frankfurt
30 (San)	Arrival in Tokyo

ANNEX 3

List of Interviewees

(Jan. 27 - Feb. 24, 1989)

Embassy of Japan in Cairo

First Secretary	Inoue
First Secretary	Furui

JICA Cairo Office

Director	Iimura
Staff	Komori

MINISTRY OF INTERNATIONAL COOPERATION (MOIC)

Mr. Saad Bayumi	Under Secretary
Mr. Harmed Mustafa	General Director
Mr. Mohasen Shadek	Manager, Japan Desk

NATIONAL TELECOMMUNICATION INSTITUTE (NTI)

Prof. Dr. A. Y. Bilal	Director
Prof. Dr. Osman L. El-Sayaed	Assist. Director
Prof. Dr. Mohamad Mounir Shaker	Consultant
Prof. Dr. Mohammed Zaki	Consultant
Prof. Dr. Nabil Naoum Hanna	Chief, Electronics Dept.
Dr. A. El-Sawy	Chief, Network Planning Dept.
Eng. Safia Hamed Dief	Chief, Computer & Systems Dept.
Dr. Raafat Asfour	Chief, Switching & Traffic Dept.
Dr. Amany Farrag	Chief, Transmission Dept.

ARAB REPUBLIC OF EGYPT NATIONAL TELECOMMUNICATIONS ORGANIZATION (ARENTO)

Eng. Wagdi A. Hamid	Chairman, Board of Directors
Eng. Farouk A. Mohamed	Vice Chairman for Project & Planning
Eng. Mahmoud El-Soury	Vice Chairman for Maintenance
Eng. Abdel W. M. Dokky	Chief, Sector of Planning & Follow-up
Eng. Tawfik El-Shamy	Chief, Sector of Training
Eng. Mohmoud El-Shaer	Sector Chief, Cannal cities and Sinai
Eng. Magdy M. Hanna	Manager of Maintenance for Exchange and Microwave for Canal cities sector and Sinai and Red Sea
Eng. Soad	Chief, Maintenance for Port Said Exchange
Eng. Sanaa Soliman	Manager for Transit exchange, Cairo
Eng. Ahmed El-Sayed	Fiber Optics Maintenance Supervisor for Cairo
Eng. Mohamed Fawzi	Active Manager West Cairo Fiber & Microwave Transmission

CAIRO UNIVERSITY

Prof. Dr. El-Said Talkhan	Chairman of Electronic & Communications Dept.
Dr. Amr Baadawy	

EGYPT ELECTRICITY AUTHORITY (EEA)

Eng. Khalaf El-Rashed	Upper Egypt Regional Control Center
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EGYPTIAN GENERAL PERTOLEUM COMPANY (GUPCO)

Mr. Adly Lasheen	Chief, Telecommunications Dept.
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EGYPTIAN RADIO AND TV UNION

Mr. Farooq Ahmed

Director, Engineering

Mr. Nabil Abbas

Head of Training

MISR BANK

Mr. M. Boriny

General Manager of Operation

ANNEX 4-1

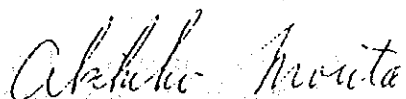
MINUTES OF DISCUSSIONS
ON
THE BASIC DESIGN STUDY
ON
THE PROJECT FOR EXPANSION OF
THE NATIONAL TELECOMMUNICATION INSTITUTE IN
THE ARAB REPUBLIC OF EGYPT

In response to the request made by the Government of the Arab Republic of Egypt, the Government of Japan decided to conduct a Basic Design Study on the Project for Expansion of the National Telecommunication Institute (hereinafter referred to as "the Project") and the Japan International Cooperation Agency (JICA) sent the Basic Design Study Team headed by Mr. Akihiko Morita, official of Grant Aid Division, Economic Cooperation Bureau, Ministry of Foreign Affairs, from January 27, to February 24, 1989.

The team had a series of discussions with the authorities concerned of the Government of the Arab Republic of Egypt, headed by Prof. Dr. A. Y. Bilal, Director of the National Telecommunication Institute (NTI), and conducted a field survey.

As a result of the study, both parties have agreed to recommend to their respective Governments that the major points of understanding reached between them as attached herewith should be examined towards the realization of the Project.

Cairo, February 4, 1989



Akihiko Morita
Leader,
Basic Design Team,
Japan International
Cooperation Agency, Japan



Prof. Dr. A. Y. Bilal
Director,
National Telecommunication
Institute,
Arab Republic of Egypt

ATTACHMENTS

1. Objective of the Project

The objectives of the Project is to provide necessary telecommunications equipment and to expand the activities of the National Telecommunication Institute (NTI) in response to the increasing demand of high grade training and technical consulting services necessary for development and modernization of the telecommunications network in the Arab Republic of Egypt and neighboring countries.

2. Expansion of the NTI activities

The training demand in the field of telecommunications in Egypt is rapidly increasing in cope with implementation of the Second Socio-Economic Development Five Year Plan (1987/88-1991/1992). With appropriate equipment and facilities installed by the Project, NTI will enlarge its capability of expanding the training programs and accepting more engineers from different telecommunication sectors in the nation.

Furthermore, NTI has a plan to receive trainees from neighboring countries as an indispensable part of the Project under Presidential Decree No.193 in the year of 1983.

NTI will be ready to accept up to 50% of trainees from neighboring countries if it is requested.

The NTI graduates are trained up with the ability of :

- dealing with advanced technology
- solving technical problems and
- providing leadership for technicians.

Thus, NTI is expected to expand the activities both in quality and quantity in order to contribute more to the improvement of social infrastructure in Egypt and the neighboring counties.

3. Responsible Ministry and Executing Agency

3-1 The Ministry responsible for the Project is the Ministry of Transport, Communications and Maritime Transport.

3-2 The executing agency for the Project is NTI under the supervision of the Ministry of Transport, Communications and Maritime Transport.

4. Outline of Training Course

The outline of training course is as shown in Annex I.

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5. Training Needs of NTI

5-1 Both sides confirmed that NTI accepts trainees from different telecommunication sectors including ARENTO, governmental organizations and private companies through the country. The details of the plan in the fiscal year 1991/1992 are as shown in Annex II.

5-2 Both sides confirmed that NTI has a plan to increase the number of trainees from neighboring countries in accordance with the improvement of technical capabilities of NTI in the future. The details of the plan in the fiscal year 1991/1992 are as shown in Annex III.

5-3 And the other supplementary data regarding the needs of training courses has been also submitted by NTI.

6. Major Items Requested

The major items requested by NTI are listed in Annex IV.

7. Project Site

The Project site is at 5, El-Mokhayem El-Dayem Street, Nasr City, Cairo, shown in Annex V.

8. Grant Aide Program

8-1 Both sides confirmed that the systems and procedures of the Japanese grant aid had been explained by the previous study team and understood by the Egyptian side.

8-2 The study team will convey to the Government of Japan the request of NTI that the Government of Japan takes necessary measures to cooperate in implementing the Project by providing necessary facilities and equipment under the Japanese grant aid program.

8-3 The Government of the Arab Republic of Egypt has agreed to provide the necessary measures as listed in Annex VI on condition that the grand aid by the Government of Japan should be extended to the Project.

8-4 The Egyptian side will take necessary actions to expedite the approval for executions of the Project by the Government of Arab Republic of Egypt.

8-5 Both sides confirmed that A-1 forms requesting Japanese experts are already proposed through diplomatic channel.

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ANNEX I

Outline of Training Course

Program	Continuing Education Program	ARENTO Special Program	Telecommunication Diplomas	Trainers Training Program
Objectives	<ul style="list-style-type: none"> Refreshment of basic telecommunication Solid concise overview of basic and new technologies 	<ul style="list-style-type: none"> Integrated overview of computer sciences Integrated working knowledge of modern telecommunication systems 	<ul style="list-style-type: none"> To create highly qualified specialized engineering staff in the fields of: <ul style="list-style-type: none"> Transmission systems Eng. Switching systems Eng Network planning and Management Communication Equipment 	<ul style="list-style-type: none"> To introduce ARENTO's instructors to new technologies introduced in the network. To help them build up new training facilities.
Audience	Telecommunication Engineers at large	ARENTO Engineers	ARENTO Engineers (primarily).	ARENTO's Training Center Instructors
Duration	Two-weeks (48-60 hrs)	One year (night courses) Three 13-week periods (300 hrs)	<ul style="list-style-type: none"> One year, 30-weeks 20 hr/week or Two years, 60-weeks 10 hr/week 	---
Course Categories	<ul style="list-style-type: none"> Basic sciences Telecommunication sciences. Telecommunication systems. Computer sciences 	<ul style="list-style-type: none"> Computer sciences Telecommunication sciences 	<ul style="list-style-type: none"> Four Diplomas consisting of: <ul style="list-style-type: none"> 3 Core Courses 4 Specialisation courses. + Laboratory + Study and research project. 	---
Number of Courses	18 (1988 - 1989)	6 Computer Sciences 6 Telecommunication Sciences.	Total 23 Courses	---

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Program	Continuing Education Program	AREITO Special Program	Telecommunication Diplomas	Trainers Training Program
Course Structure	Lectures 75% + Demonstrations + Experimental Lab.	Lectures 65% + Demonstrations + Experimental Lab work 25% Assignments + Seminars 10%.	Lectures + Demonstrations Laboratory work + Field work + Project seminars.	---
No. of trainees	average / course 11.5 (1987-1988) Total 196	20 Computer Sciences + 20 Telecom. Sciences	10-20 / diploma	---
Degree	ITI Certificate of Attendance	ITI Certificate of success	Diploma Degree (Accredited from supreme council of universities)	ITI Certificate of Attendance.

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ANNEX II

Continuing Education Program
(Fiscal Year:1991/1992)

Course Name	A	B	C	D	E	F	G	H	I	J	K	S
(1) Digital Electronics	12	6	5	-	2	1	2	5	1			34
(2) Electronics Measurement & Instrumentation	5	2	2	-	1	-	1	2	1			14
(3) Microwave Engineering	12	5	5	-	-	5	-	5	-			32
(4) Microprocessors and Their Applications	10	5	5	-	2	1	2	5	-			30
(5) Basic Communications	12	5	5	2	2	1	2	5	-			34
(6) Digital Signal Processing	6	2	2	-	-	2	-	2	2			16
(7) Digital Communications	25	8	11	3	3	2	4	8	-			64
(8) Measuring Techniques in Telecommunications	13	4	6	3	2	1	4	1	-			34
(9) Data Transmission (I)	10	5	4	2	1	1	1	4	-			28
(10) Electronic Exchanges (A)	23	11	10	1	3	2	3	10	1			64
(11) Satellite Communication Systems	12	5	5	-	1	2	1	4	-			30
(12) Data Transmission (II)	11	5	5	-	1	1	1	5	3			32
(13) Analog LOS Microwave Communication Systems	24	12	10	5	3	2	3	5	-			64
(14) Electronic Exchanges (B)	23	11	10	1	3	2	3	10	1			64
(15) Optical Fiber Communication Systems (1)	23	11	10	2	3	2	3	10	-			64
(16) Optical Fiber Communication Systems (2)	10	5	4	-	2	1	2	4	2			30
(17) Database Systems	10	5	4	-	1	-	1	4	3			28
(18) Digital LOS Microwave Communication Systems	26	11	10	1	3	2	3	7	1			64
(19) Mobile Communications	6	3	2	-	1	-	1	2	1			16

A : ARENTO
 B : GOVERNMENTAL ORGANIZATIONS
 C : PETROLEUM SECTOR
 D : RADIO & TV UNION
 E : EGYPT ELECTRICITY AUTHORITY

F : PRESIDENCY OF THE REPUBLIC
 G : AVIATION SECTOR
 H : INDUSTRIAL SECTOR
 I : OTHERS

D i p l o m a

(Fiscal Year : 1991/1992)

Course Name	A	B	C	D	E	F	G	H	I	J	K	S
(1) Transmission Systems Engineering												20
(2) Switching Systems Engineering												20
(3) Network Planning and Management												20
(4) Communication Systems Equipment												20

A : ARENTO

F : PRESIDENCY OF THE REPUBLIC

B : GOVERNMENTAL ORGANIZATIONS

G : AVIATION SECTOR

C : PETROLEUM SECTOR

H : INDUSTRIAL SECTOR

D : RADIO & TV UNION

I : OTHERS

E : EGYPT ELECTRICITY AUTHORITY

S : TOTAL

ARENTO Special Program

(NO. of Participants)

(Fiscal Year: 1991/1992)

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Training Needs of Neighboring Countries

Fiscal Year (1991/1992)

Course Name		Capacity of Trainees	Allotment of Foreign Trainees	Nationality & Source of Expenses of Trainees A/B A: Egyptian Source of Expenses B: Other Expenses
1	Digital Electronics	20 x 2	6	SUDAN (2/0), KENYA (2/0), QATAR (0/1), YEMEN (0/1)
2	Electronics Measurement & Instrumentation	20 x 1	6	SUDAN (2/0), KENYA (2/0), YEMEN (0/1), QATAR (0/1)
3	Microwave Engineering	20 x 2	8	JORDAN (0/2), SAUDI ARABIA (0/2), YEMEN (0/2), IRAQ (0/2)
4	Microprocessors and Their Applications	20 x 2	10	JORDAN (0/2), BAHREIN (0/2), U.A.E. (0/2), SUDAN (2/0), KENYA (2/0)
5	Basic Communications	20 x 2	6	SUDAN (2/0), KENYA (2/0), YEMEN (0/1), SOMALIA (1/0)
6	Digital Signal Processing	20 x 1	4	JORDAN (0/1), IRAQ (0/2), SAUDI ARABIA (0/1)
7	Digital Communications	20 x 4	16	JORDAN (0/2), IRAQ (0/2), SAUDI ARABIA (0/2) YEMEN (0/2), OMAN (0/1), QATAR (0/1)
8	Measuring Techniques in Telecommunications	20 x 2	6	SUDAN (2/0), QATAR (0/1), YEMEN (0/1), KENYA (2/0)
9	Data Transmission (I)	20 x 2	12	JORDAN (0/2), SAUDI ARABIA (0/2), IRAQ (0/2), BAHREIN (0/2), U.A.E. (0/2), YEMEN (0/2)
10	Data Transmission (II)	20 x 2	8	JORDAN (0/2), SAUDI ARABIA (0/2), IRAQ (0/2) BAHREIN (0/1), U.A.E. (0/1)
11	Satellite Communication Systems	20 x 2	10	SUDAN (3/0), KENYA (3/0), BAHREIN (0/2), YEMEN (0/2)
12	Electronic Exchanges (A)	20 x 4	16	SAUDI ARABIA (0/4), JORDAN (0/2), IRAQ (0/4), OMAN (0/2), QATAR (0/2), KENYA (2/0), SUDAN (2/0)
13	Electronic Exchanges (B)	20 x 4	16	SAUDI ARABIA (0/4), JORDAN (0/2), IRAQ (0/4), OMAN (0/2), QATAR (0/2), KENYA (2/0), SUDAN (2/0)
14	Analog L.O.S Microwave Communication Systems	20 x 4	16	SAUDI ARABIA (0/2), JORDAN (0/2), IRAQ (0/2), OMAN (0/2), YEMEN (0/2), U.A.E. (0/2), SUDAN (9/0), KENYA (2/0)
15	Optical Fiber Communication Systems (I)	20 x 4	16	SAUDI ARABIA (0/6), JORDAN (0/2), IRAQ (0/4) OMAN (0/2), KENYA (2/0)
16	Optical Fiber Communication Systems (2)	20 x 2	10	SAUDI ARABIA (0/4), JORDAN (0/2), IRAQ (0/4)
17	Database Systems	20 x 2	12	SUDAN (2/0), SAUDI ARABIA (0/2), BAHREIN (0/2) OMAN (0/2), U.A.E. (0/2), JORDAN (0/2)
18	Digital LOS Microwave Communication Systems	20 x 4	16	JORDAN (0/2), IRAQ (0/2), U.A.E. (0/2), OMAN (0/2) YEMEN (0/2), SAUDI ARABIA (0/2), SUDAN (2/0), KENYA (2/0)
19	Mobile Communication Systems	20 x 1	4	JORDAN (0/2), SAUDI ARABIA (0/2)

Training Needs from Neighboring Countries

Fiscal Year (1991/1992)

	Course Name	Capacity of Trainees	Allotment of Foreign Trainees	Nationality & Source of Expenses of Trainees A/B A: Egyptian Source of Expenses B: Others	
DIPLOMAS	1 Transmission Systems Engineering	20 x 1	4	JORDAN (0/1), IRAQ (0/1), SAUDI ARABIA (0/1), SUDAN (0/1)	
	2 Switching Systems Engineering	20 x 1	4	IDENTICAL	
	3 Network Planning & Management	20 x 1	4	IDENTICAL	
	4 Communication Systems Equipment	20 x 1	4	IDENTICAL	
ARENTO SPECIAL PROGRAM	1 Digital Electronics	20 x 2	-		
	2 Microprocessors	20 x 2	-		
	3 Analogue & Digital Transmission	20 x 2	-		
	4 Digital Switching Systems	20 x 2	-		
	5 Microwave L.O.S & Satellite Communications Systems	20 x 2	-		
	6 Optical Fiber Communication Systems	20 x 2	-		
	7 Computer Organization & Interfacing	20 x 2	-		
	8 Assembly Language	20 x 2	-		
	9 Basic (High Level Language)	20 x 2	-		
	10 Operating Systems	20 x 2	-		
	11 Data Base Systems	20 x 2	-		
	12 Software Engineering	20 x 2	-		
	13				
	14				
	15				

Annex IV

Major Equipment Requested

1 Exchange and Traffic Department

- 1) Digital telephone switching system
- 2) Traffic generation equipment
- 3) Maintenance equipment
- 4) Workstation

2 Network Planning Department

- 1) Telephone network design system
- 2) Telephone line traffic measuring equipment
- 3) Telephone / non-telephone line-testing equipment
- 4) Workstation

3 Transmission Department

- 1) Digital microwave system equipment
- 2) Optical fiber system equipment
- 3) Telephone multiplexer
- 4) Maintenance and measuring equipment
for microwave and
for optic
- 5) Microwave field strength meter with RF head of 2, 6 and
11 GHz.
- 6) High power SG (2, 6, 11 GHz)
- 7) Waveguide/coaxial cable component
- 8) Small earth station
- 9) Antenna system
- 10) Workstation

4 Electronics Department

- 1) CAD system
- 2) Printing circuit board fabrication equipment
- 3) Electronic circuit/microprocessor training kits
- 4) Measuring equipment
- 5) Workstation

5 Computer and Systems Department

- 1) Computer and its peripheral equipment
- 2) Local area network unit
- 3) Workstation
- 4) Terminals for training

6 Administrative Department

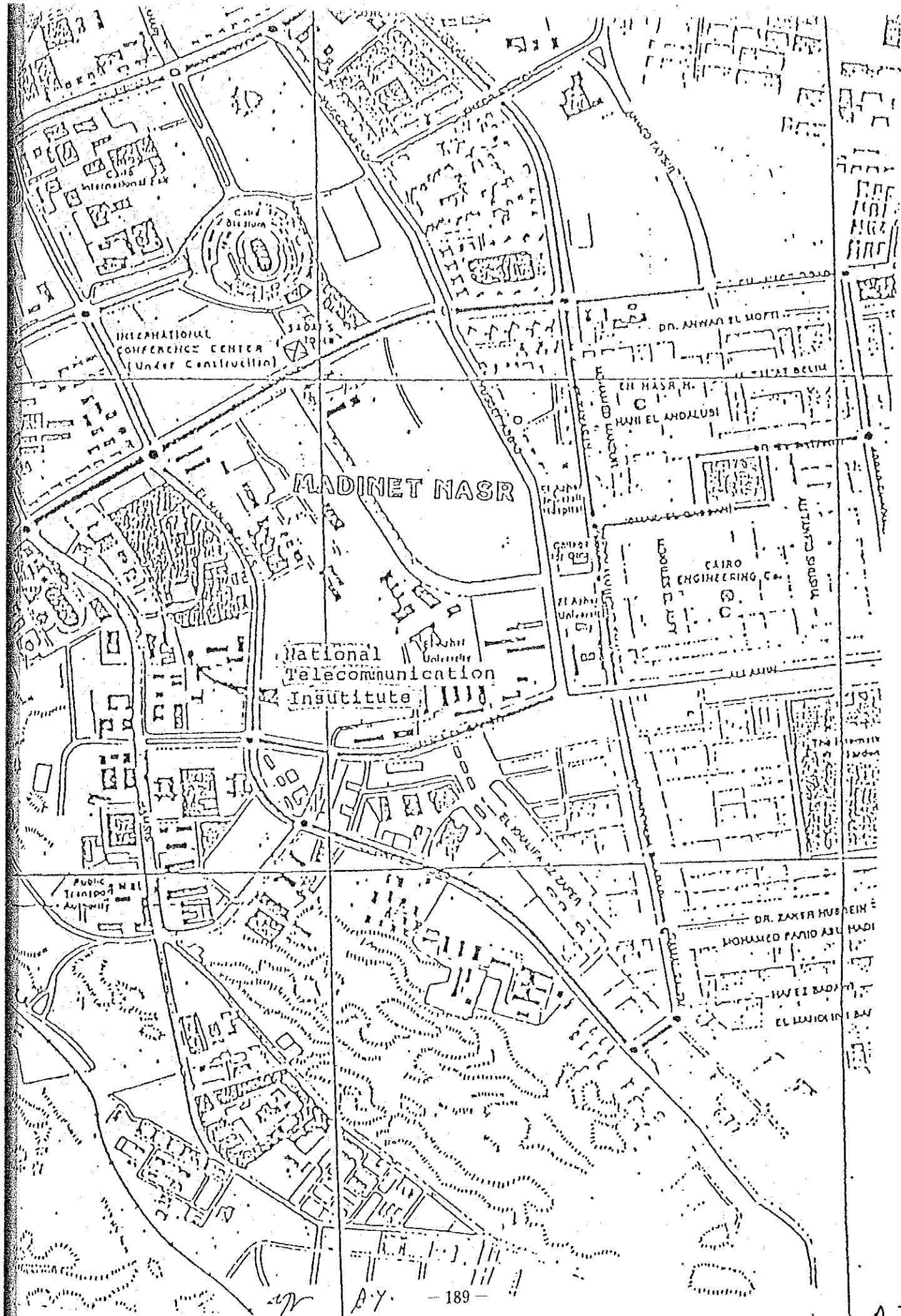
- 1) Workstation for the Administration
- 2) CAL system and coursewares

Annex V

Proposed Project Site (1/2)

A.Y.

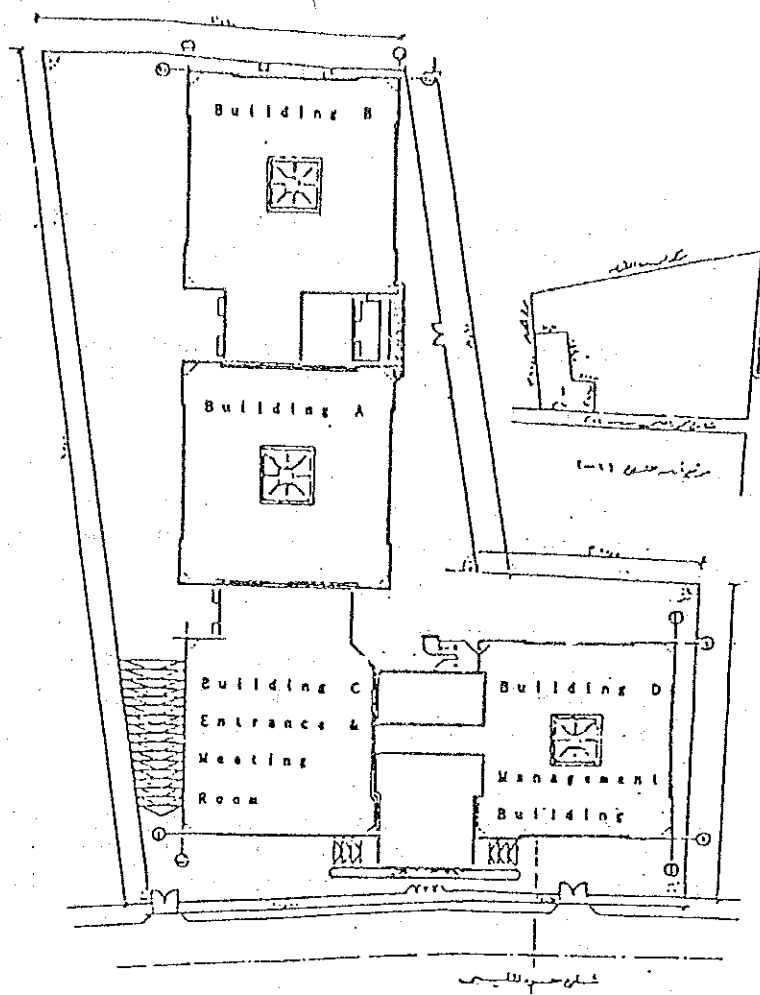
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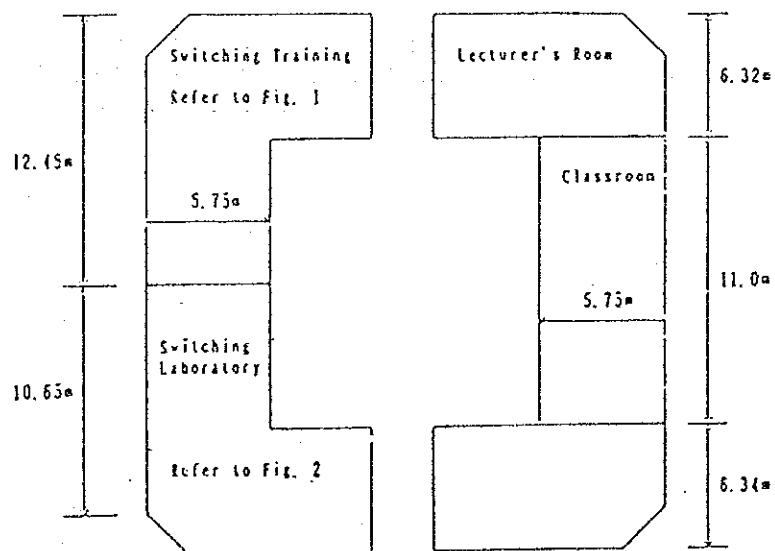
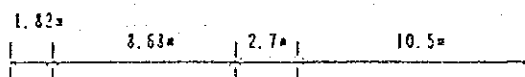
Annex V

Proposed Project Site (2/2)

A.Y.



Floor Layout Plan



Ground floor layout plan

Building A

A

A.Y.

Annex VI

Recommendations for Undertakings by the Governments of the Arab Republic of Egypt, in accordance with Egyptians Regulations and relevant Laws.

1. To secure appropriate place with necessary facilities for electricity and other incidental facilities for the installation of the equipment.
2. To ensure the necessary budget from the fiscal year 1989/1990 and personnel for the proper and effective operation and maintenance of facilities and equipment to be provided under the grant.
3. To ensure prompt unloading, tax exemption, customs clearance at the port of disembarkation in Egypt and prompt internal transportation of materials and equipment provided under the grant in accordance with the law and regulations concerned in Egypt.
4. To accord Japanese nationals whose services may be required in connection with the supply of the products and the services under the verified contracts such facilities as may be necessary for their entry into Egypt and stay therein for the execution of the Project.
5. Japanese nationals involved in the Project will not be subject to any customs duties, internal taxes, and other fiscal levies which may be imposed in Egypt with respect to the supply of the products and services under the verified contract.
6. To bear all expenses, other than those to be borne by the grant, necessary for construction of the facilities as well as for the transportation and installation of the equipment.

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ANNEX 4-2

MINUTES OF DISCUSSIONS
ON
THE PROJECT FOR EXPANSION OF
THE NATIONAL TELECOMMUNICATION INSTITUTE IN
THE ARAB REPUBLIC OF EGYPT

In response to the request made by the Government of the Arab Republic of Egypt, the Government of Japan decided to conduct a Basic Design Study on the Project for Expansion of the National Telecommunication Institute (hereinafter referred to as "the Project") and the Japan International Cooperation Agency (JICA) sent the Basic Design Study Team headed by Mr. Akihiko Morita, official of Grant Aid Division, Economic Cooperation Bureau, Ministry of Foreign Affairs, from January 27, to February 24, 1989.

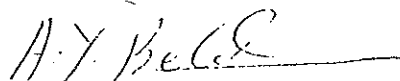
As a result of the study, JICA prepared a Draft Final Report and dispatched a team headed by Mr. Akihiko Morita, official of Grant Aid Division, Economic Cooperation Bureau, Ministry of Foreign Affairs to explain and discuss it with the relevant officials of the Government of Egypt from April 19th to 30th, 1989.

Both parties had a series of discussions on the Draft Final Report and agreed to recommend to their respective Governments that the major points of understanding reached between them, attached herewith, should be examined towards the realization of the Project.

Cairo, April 27, 1989



Akihiko Morita
Leader,
Basic Design Team,
Japan International
Cooperation Agency, Japan



Prof. Dr. A. Y. Bilal
Director,
National Telecommunication
Institute
Arab Republic of Egypt

ATTACHMENT

1. The Egyptian side agreed in principle on the basic design proposed in the Draft Final Report.
2. The Egyptian side has understood Japan's grant aid system and reconfirmed that necessary measures which are manifested in the Annex VI of the Minutes of Discussions on the Project signed on February 4, 1989, will be taken by the Egyptian side on condition that the grant aid by the Government of Japan is extended to the Project.
3. The Egyptian side ensured that the necessary budget and the adequate number of the personnel for the proper and effective operation and maintenance of National Telecommunication Institute will be secured.
4. Both parties confirmed that NTI would undertake all the necessary measures to accept foreign trainees, as mentioned in the Minutes of Discussion signed on February 4, 1989, on its own responsibility.
5. Both parties confirmed that in particular for this project, it is essential for computer selection to take into account the vender's capability to provide adequate maintenance and support in Egypt.
6. The team confirmed that a computer aided network design support system is essential for accomplishing the NTI's role defined in the Presidential Decree and that the system will be well utilized judging from the study conducted by the team on existing data concerned and condition of implementation for network planning.
7. The Final Report (10 copies in English) will be submitted to the Egyptian side at the beginning of June, 1989.

A-X

ANNEX 5

EQUIPMENT LIST

I Switching and Traffic Department	196
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VI Administration and Support Department	211

EQUIPMENT LIST

I. Switching and Traffic Department

Equipment	Quantity	Function and feature	Note
1. Switching system Comprising: (1) Digital switching equipment and NTI local data	1 System	<ul style="list-style-type: none"> Subscriber circuit, trunk circuit, transmission interface Central processing unit Memory unit Clock unit Switch module: T-S-T Magnetic tape unit Common channel signaling module 	<p>(1) Interfaces to be furnished:</p> <ul style="list-style-type: none"> Subscriber line circuit: 200 cct Analog trunk 60 cct Digital transmission interface (2 MHz): 5 IP <p>(2) Signaling systems to be provided: CCITT R1, R2, No7</p> <p>(3) Subscriber service features:</p> <ul style="list-style-type: none"> Barred message rate call Combination dialing Denied terminating Free terminating Hot line service Howler tone sending Immediate ringing International direct dialing Line lockout Malicious call tracing Multi-line hunting Abbreviated dialing Don't disturb serving Three way calling Toll restriction Alarm-call service Call transfer Call waiting Call back
(2) Maintenance and administration terminal	5 Sets	Man-machine interface	
(3) Power unit	1 Sys	Power reception, rectification, distribution	
(4) Spare parts	1 Lot		
(5) Measuring equipment	1 Lot		
• Digital multimeter	1 Set	Voltage, current, resistance, internal battery for printer.	
• Frequency counter	1 Set	1MHz to 1.3GHz, input voltage 25mV-1Vrms.	
• Oscillator/Levelmeter	1 Set	200Hz to 30MHz, -130dBm to +30dBm.	
• Logic analyzer	1 Set	Timing/state, 100/25MHz (80ch).	
• Auto TIMS	1 Set	-40 to 150KHz, level/noise/SN.	
(6) Maintenance tool	1 Lot		
(7) Installation material	1 Set	Raised floor, MDF, VDF, cable	
(8) Documentation	1 Set	Manual on hardware and software	Command manual, drawing of installed system, etc.

EQUIPMENT LIST

Equipment	Quantity	Function and feature	Note
2. Traffic generator (1) Generator for subscriber line (2) Generator for analog trunk (3) Generator for digital transmission	3 Sets 1 Set 1 Set	Programable, 30 lines a set ditto ditto	
3. No.7 signaling monitor	1 Set	CAS/CCS signal monitoring	
4. Training simulator	1 Set	Guidance on commands for the control of switching system.	
5. On-line personal computer (On-line PC) (1) On-line PC (2) Uninterruptible power supply unit (UPS) for on-line PC	1 Set 1 Unit	- Refer to Computer and Systems Dept. 2. (1) - Refer to Computer and Systems Dept. 5. (2)	

EQUIPMENT LIST

II. Network Planning Department

Equipment	Quantity	Function and feature	Note
1. Traffic measuring equipment			
(1) Measuring equipment	5 Sets	For subscriber lines, data accumulation, 40 lines a set.	
(2) Off-line personal computer	2 Sets	Statistic processing of data.	
(3) UPS	4 Units	- Refer to Computer and Systems Dept. 5. (2)	
2. Network designing system			
(1) Graphic workstation	1 Set	• Input data: traffic, number of exchanges, map information. • Data processing.	
(2) Color graphic printer	1 Set	Graphic output of telephone network, transmission routes, etc.	
(3) UPS	1 Unit	- Refer to Computer and Systems Dept. 5. (2)	
3. Measuring equipment			
(1) Protocol analyzer	3 Sets	X21, X25, X75 protocol.	
(2) Data communication analyzer	2 Sets	V24, V28, X20, X21 protocol.	
(3) Modem tester	2 Sets	V24, V28 protocol.	
(4) Voice band analyzer	2 Sets	40Hz to 40KHz.	
(5) Digital transmission analyzer	2 Sets		
(6) Artificial telephone line	2 Sets	Core 0.32 to 0.9mm, 0 to 10 dB, 1 dB step	
4. On-line PC			
(1) On-line PC	8 Sets	- Refer to Computer and Systems Dept. 2. (1)	Four (4) sets have 40MB HDD, the other 4 sets have 20MB HDD.
(2) UPS for on-line PC	4 Units	- Refer to Computer and Systems Dept. 5. (2)	

EQUIPMENT LIST

III. Transmission Department

Equipment	Quantity	Function and feature	Note
1. Digital 6GHz Radio System	2 Systems	Bit Rate: 68 Mbits/s, MOD:PSK, IF:70 MHz	1 System : Stand-by
(1) Transmitter-Receiver	4 Sets	Pout: 20dBm, NF: < 3.5dB	
(2) Transmitter-SD-Receiver	1 Set	Pout: 30dBm, MID-SD System	For propagation test
(3) Modulator-Demodulator	4 Sets	MOD: PSK, DEM: Coherent Detector	
(4) Modulator & Frame	1 Set	MOD: PSK	Remote station for propagation test
(5) Branching Circuit	2 Sets	Total Loss with Filters: < 4.5dB	
(6) Fading Simulator	2 Units	6 GHz Band and 11 GHz Band	
(7) Alarm Distribution Board	2 Sets		
(8) Power Distribution Board	2 Sets		
(9) Supervisory & Control System	1 Set	for 2 Stations & 1+1 Systems	
(10) 6 GHz Parabolic Antenna	2 Units	1.8m ϕ , Dual Polarizations. (V & H)	
(11) 6 GHz Parabolic Antenna	1 Unit	2.4m ϕ , Dual Polarizations. (V & H)	
(12) 6 GHz Waveguide	200 m	Corrugated Elliptical Type	
(13) Antenna Mount Structure	3 Sets	for 1.8m ϕ \times 2 and 2.4m ϕ \times 1	
(14) Dehydrator	2 Sets	Air: >1 Liter/min.	for Waveguide
(15) Tools & Fittings	1 Lot		for Waveguide installation
(16) Attenuator	2 Units	50dB Fixed Type and 50dB Variable type	
(17) Switch	2 Units	Coaxial Type	

EQUIPMENT LIST

Equipment	Quantity	Function and feature	Note
2. Digital 11GHz Radio System	1 System	Bit Rate: 140 Mbits/s, MOD: 16 QAM, IF: 70 MHz	
(1) Transmitter-Receiver	2 Sets	Pout: 20dBm, NF: <5dB	
(2) Transmitter-Modulator	1 Set	Pout: 30dBm	
(3) Modulator-Demodulator	2 Sets	MOD: 16QAM, DEM: Coherent Detect.	for Fading Test
(4) Power Distribution Board	2 Sets		
(5) 11 GHz Parabolic Antenna	1 Unit	1.8m ϕ , Dual Polarization. (V & H)	
(6) 11 GHz Parabolic Antenna	1 Unit	2.4m ϕ , Dual Polarization. (V & H)	
(7) 11 GHz Waveguide	200 m	Corrugated Elliptical Type	
(8) Antenna Mount Structure	2 Sets	for 1.8m ϕ \times 1 and 2.4m ϕ \times 1	
(9) Dehydrator	2 Sets	Air: 1 Liter/min.	for Waveguide
(10) Tools & Fittings	1 Lot	for Waveguide installation	
(11) Attenuator	2 Units	50dB Fixed Type & 50dB Variable Type	
(12) Switch	2 Units	Coaxial Type	
3. PCM Multiplex System			
(1) 2M PCM Multiplexer	2 Sets	Input: Voice 30 ch, 600 ohm	
(2) 8M PCM Multiplexer	2 Sets	Output: 2048 KB/S, 75 ohm	
(3) 34M PCM Multiplexer	2 Sets	Output: 8448 KB/S, 75 ohm	
(4) 140M PCM Multiplexer	1 Set	Output: 34.368 MB/s, 75 ohm	
(5) DDF & VDE	2 Sets	Output: 139.264 MB/s,	

EQUIPMENT LIST

Equipment	Quantity	Function and feature	Note
4. 140M Fiber Optic Transmission System	<u>2 Systems</u>	Bit Rate: 140 Mbits/s	
(1) Line Terminating Equipment	4 Sets	Optical Mode: Single, Wave Length: 1.3μm	
(2) Repeater Equipment	2 Sets		Office Type Repeater
(3) Supervisory & Controlling System	1 Set	For 2 Terminal Stations & 1 Repeater	
(4) Line Switch	2 Sets		
(5) Optical Fiber Cable	140 Km	SM Fiber, 1 Core/Cable, 0.7dB/km	4 Reals (35km×4)
(6) Optical Fiber Cable	2 Km	SM Fiber, 4 Cores/Cable, 0.7dB/km	
(7) Joint Box	1 Lot		
(8) Attenuator	4 Sets	25dB Fixed Type	
5. Satellite TV Receiver System	<u>1 System</u>	RF: Ku-Band, IF: 1GHz	
(1) Antenna System	1 Set	Diameter: 4.5m, with Drive Motors	
(2) Low Noise Converter	1 Set	180 K Uncooled FET Amplifier and Mixer	
(3) Satellite TV Receiver	1 Set	TV Receiver, Clamper, Decoder	
(4) TV Monitor	1 Set	PAL & SECAM System, Color Picture	
6. Microwave Training Bench	4 Sets		
7. System Display Board	2 Sets	For Radio and Optical System	
8. On-line PC	2 Sets	- Refer to Computer and Systems Dept. 2. (1)	
(1) On-line PC	1 Unit	- Refer to Computer and Systems Dept. 5. (2)	
(2) UPS for on-line PC			

EQUIPMENT LIST

Equipment	Quantity	Function and feature	Note
9. Power Supply System	5 sets	AC 220V to DC 48V Converters FOR 6G, 11G, FOTS & SD Systems (50A x 2, 10A x 3)	
10. Solar Power System	1 Set	Two Solar Panels(100W) , Two Control Panels, Battery and Dummy Load	
11. Spare Parts	1 Lot		
12. Installation Materials	1 Lot		
13. Documentation	1 Lot		
14. Testing & Measuring Equipment 14-1 For Radio and MUX System			
(1) Power Meter Power Sensor Power Sensor	4 sets 2 sets 2 sets	Main Frame 10 MHz-18 GHz, Pin: -30 to +20 dBm 10 MHz-18 GHz, Pin: -70 to -20 dBm	
(2) Frequency counter	2 sets	10 MHz-18 GHz	
(3) Digital Transmission Analyzer	2 sets	BER Measuring: 1 kHz-150 MHz Jitter Measuring	
(4) Spectrum Analyzer	1 set	10 kHz-23 GHz, Pin: -125 to +30 dBm	
(5) Spectrum Analyzer	1 set	10kHz- 23 GHz, Pin: -131 to +30 dBm	
(6) Synchroscope	2 sets	100 MHz, 2 CH, 1 mV/div, Storage Type	
(7) Synchroscope	2 sets	400 MHz, 3 CH, 5 mV/div, 500ps/div, CRT Digital Read out	
(8) Microwave System Analyzer	2 sets	70 MHz Band, f-chara., Delay, DG, DP, Spectrum, Deviation, etc.	
(9) Microwave Frequency Converter	1 set	Pin: 5.8-8.4 GHz, Fout: 70MHz	

EQUIPMENT LIST

Equipment	Quantity	Function and feature	Note
(00) Microwave Frequency Converter	1 set	Fin: 10-12.4 GHz, Fout: 70MHz	
(01) Vector Signal Generator	1 set	Fin: 10 MHz-3GHz, Output: Max+10 dBm, Mod: BPSK, QPSK, 8PSK, 16QAM	
(02) Vector Modulation Analyzer	1 set	Pin: 50-200 MHz, -5 to -20 dBm, Analyzing I/Q for PSK & QAM	
(03) Noise Test Set	1 set	C/N vs BER with BER Measuring Set	
(04) Jitter Generator	2 sets	Jitter Frequency: 10 Hz to 5 MHz	
(05) Error Rate Measuring Equipment	2 sets	(2 , 8 and 34 MB) x 4, with Printer	
(06) Tracking Generator	1 set	Pout: 20 kHz-2 GHz, -59 to 0 dBm	
(07) Video Signal Generator	1 set	Output: PAL Video Signals	
(08) Satellite TV Signal Transmitter	1 set	Output: 1 GHz, -20 dBm, in Variable FM Deviation	
(09) Video Signal Analyzer	1 set	Measuring Non/Linearity Distortion, S/N, f-chara., DG, DP, Video Noise, etc.	
(20) TV Waveform Monitor	1 set	Pin: -20 dBm to +5 dBm, 75 ohm	
(21) Signal Generator	2 sets	Fout: 0.1-1 GHz, MOD: AM, FM, PM	
(22) Chart Recorder	3 sets	2 Pens	

EQUIPMENT LIST

Equipment	Quantity	Function and feature	Note
14-2 For Optical Fiber Transmission System			
(1) Stabilized Light Source	2 sets	For SM Fiber 1.3 μ m, Pout: -6dBm (LD)	
(2) Optical Power Meter	2 sets	Pin: 0.75-1.7 μ m, -70 to +3 dBm With two Detectors	
(3) Optical Wavelength Meter	2 sets	Pin: 1.0-1.6 μ m, -50 to +5 dBm	
(4) Optical White Light Source	1 set	Pout: 0.4-1.6um	
(5) Optical Spectrum Analyzer	2 sets	Pin: 0.6-1.75 μ m, -70 to +10 dBm For GI/SM Fiber, With Printer	
(6) Optical Time Domain Reflectometer	2 sets	For SM Fiber, 1.3 μ m, with LED, With Printer	
(7) Chromatic Dispersion Characteristics Measuring Equipment	1 set	For SM Fiber, 1.2-1.6 μ m, With Printer	
(8) E/O Converter	1 set	For SM Fiber, 1.3 μ m, LD, 100 kHz-1500MHz	
(9) O/E Converter	1 set	For SM Fiber, 1.3 μ m, 100 kHz-1000MHz	
(10) Optical Return Loss Measuring Set	1 set	For SM Fiber, 1.3 μ m, LD included	
(11) Optical Variable Attenuator	4 sets	For SM Fiber, 1.3/1.55 μ m	
(12) Optical Switch	4 sets	For SM Fiber, 1.3 μ m, Loss: <3 dB	
(13) Optical Coupler	4 sets	For SM Fiber, 1.3 μ m	
(14) Fiber Arc-Fusion Splicer	1 set	For GI/SM, Clad Dia.: 80-150 μ m, Jaket Diameter : 0.1-1.5 mm	
(15) Connectorization Kit	1 set	For GI, Connection Loss: < 1 dB	

EQUIPMENT LIST

IV. Electronics Department

Equipment	Quantity	Function and feature	Note
<p>1. Printed circuit fabrication equipment</p> <p>(1) Standard circuit board</p> <p>(2) Ultraviolet exposure unit</p> <p>(3) P.C.B. processing & wash tank</p> <p>(4) Precision mini drill</p> <p>(5) P.C.B. etching tank</p> <p>(6) P.C.B. cutter</p> <p>(7) Printed circuit work frame</p> <p>(8) Ultrasonic cleaning tank</p>	<p>50 Units</p> <p>50 Units</p> <p>2 Sets</p> <p>2 Sets</p> <p>2 Sets</p> <p>2 Sets</p> <p>2 Sets</p> <p>2 Sets</p> <p>2 Sets</p>	<p>1.6 x 180 x 230 mm, 14pin-IC 40pcs</p> <p>1.6 x 250 x 200 mm, sensitive type</p> <p>Exposure size 250 x 350 mm</p> <p>light source 15W x 12</p> <p>Thermoheater 100W, 52 °C</p> <p>tank capacity 200-1000cc</p> <p>Drilling diameter 0.8-1.2 mm</p> <p>6000 r.p.m., drill stand</p> <p>PCB dimension 200 x 300 mm</p> <p>immersion heater, air pump</p> <p>Cutting length 350mm</p> <p>cutting thickness 1.6 mm</p> <p>Assemble no. of PCB 34 & 42</p> <p>178 x 254 x (267 & 483) mm</p> <p>Generator capacity 150W</p> <p>tank capacity 12 liters (SUS304)</p>	
<p>2. Training Kits for analog and digital circuit</p> <p>(1) Semiconductor element experimental equipment</p> <p>(2) Electronic circuit experimental equipment</p> <p>(3) MODEM circuit experimental equipment</p> <p>(4) Pulse circuit experimental equipment</p> <p>(5) Analog-digital conversion experimental equipment</p> <p>(6) IC training equipment</p> <p>(7) 8-bit microprocessor training equipment</p> <p>(8) 16-bit microprocessor training equipment</p>	<p>2 Sets</p> <p>2 Sets</p> <p>2 Sets</p> <p>2 Sets</p> <p>2 Sets</p> <p>2 Sets</p> <p>5 Sets</p> <p>5 Sets</p>	<p>Diode/transistor/FET/Thyristor experimental equipment</p> <p>Oscillation/amplifier/W.B.amp. experimental equipment</p> <p>AM/FM modulation circuit experimental equipment</p> <p>PAM/PWM/PPM modulation circuit experimental equipment</p> <p>Counter/comparator type ADC experimental equipment</p> <p>Operational amplifier circuit experimental equipment</p> <p>8-bit microprocessor training equipment</p> <p>16-bit microprocessor training equipment</p>	

EQUIPMENT LIST

Equipment	Quantity	Function and feature	Note
3. CAD system			
(1) PCB CAD software package	2 Sets	Design entry: placement, routing plot out (HP-GL)	
(2) Personal computer	2 Sets	- Refer to Computer and Systems Dept. 2. (1)	
(3) Graphic plotter	2 Sets	Media size: A3/A4, with 6 pen, HP-GL step: 0.025 mm, velocity: 38cm/s	
(4) UPS for personal computer	1 Set	- Refer to Computer and Systems Dept. 5. (2)	
4. Measuring equipment			
(1) IC trouble shooting kit	2 Sets	Logic probe/pulser/Clip/comparator current tracer	
(2) EPROM programmer	2 Sets	Buffer memory: 4Mbit, 1-chip CPU and EPLD compatible, auto setting	
(3) Microprocessor system analyzer	1 Set	8-bit analyzer, clock: 0.5-8MHz	
(4) Logic analyzer	1 Set	16-bit analyzer, clock: 1-2MHz	
(5) Microprocessor based controller	2 Sets	Timing/state: 100/25MHz (80channels) memory: 1Kbit/channel, 8-32bit pro.	
(6) Logic probe	2 Sets	DVM: 1 mV/1Hz-10KHz, 30-56ch, HP-1B	
(7) Function generator	2 Sets	16-bit computer with 20MB HD	
(8) Digital multimeter	15 Sets	Input cur./capac./pulse: 15 mA/15pF /10hs (TTL80MHz, CMOS40MHz)	
(9) Frequency counter	5 Sets	0.1Hz-10MHz, sine/triangle/square, Output: 10Vp-p (50ohm)/20Vp-p (open)	
(10) Q meter	5 Sets	1mV-1000V (DC), 10mV-750V (AC), 10nA-10A, 1mohm-400Mohm, printer and battery	
(11) Vector impedance meter	5 Sets	1mHz-1.3GHz, input: 25mV-5Vrms, period/ratio/margin/interval	
(12) Selective level meter/oscillator	1 Set	22KHz-70MHz, Q/D, Q/L range: 5-1000/0-100	
(13) Cable fault locator	1 Set	0.095 mH-1.2H	
	1 Set	400KHz-110MHz, 10mohm-120kohm, -180 to +180deg.	
	1 Set	200Hz-30MHz, -130 to +30dBm, 75/135/150/600ohm	
	1 Set	0-9.9km/0-99.9ms, accuracy: 3% (CRT), split/short/ground/crosstalk, etc	

EQUIPMENT LIST

Equipment	Quantity	Function and feature	Note
<p>(04) Spectrum analyzer</p> <p>(05) Artificial telephone line</p> <p>(06) Frequency synthesizer</p> <p>(07) Audio analyzer</p> <p>(08) Dynamic signal analyzer</p> <p>(09) Portable instrumentation tape recorder</p> <p>(20) Band pass filter</p> <p>(21) PCM generator/monitor/noise generator</p> <p>(22) PCM transmission measuring set</p>	<p>1 Set</p> <p>1 Set</p> <p>1 Set</p> <p>1 Set</p> <p>1 Set</p> <p>1 Set</p> <p>1 Set</p> <p>1 Set</p> <p>1 Set</p> <p>1 Set</p> <p>1 Set</p>	<p>10Hz-500MHz, -135 to +20dBm. R8W 3Hz-300kHz, noise: -140dBm Wire diameter: 0.32/0.4/0.5/0.65/0.9mm, 600ohm, 0-10dB, 1dB step 1mmHz-21MHz, resolution: 1 mmHz/1mHz, 1.00 mV-10.00V, spurious: -90dBm 20Hz-100kHz, input: 50mV-300V, distortion, S/N, SINA, AC/DC level 64mmHz-100kHz, resolution: 80lines, dynamic range: 80dB, noise: -126dBV FM/direct recording DC-20kHz/4Hz-60kHz (1.5-15in/S) 41 third-octave filter band, center frequency: 2Hz-20kHz 2048Kbit/s, AMI/HDB3/NRZ/RZ, noise CCITT G227, multiplex tester 1544Kbit/s AMI/B8ZS, 2048Kbit/s CMI, bit-error/EFS/EFDS/monitor etc</p>	
<p>5. On-line PC</p> <p>(1) On-line PC</p> <p>(2) UPS for On-line PC</p>	<p>1 Set</p> <p>1 Unit</p>	<p>- Refer to Computer and Systems Dept. 2. (1)</p> <p>- Refer to Computer and Systems Dept. 5. (2)</p>	

EQUIPMENT LIST

V. Computer and Systems Department

Equipment	Quantity	Function and feature	Note
1. Center computer system comprising;	<u>1 system</u>		
(1) central processing unit	1 set	CPU -Performance: enough capability to process transactions from 40 On-line PCs -Main memory: 32 MB or more -Communications: LAN support	
(2) Console subsystem	1 set	CRT-display, keyboard, serial printer: 200cps or more	
(3) Magnetic disk unit	4 units	Capacity: -total 2.5 GB or more	
(4) Magnetic tape unit	2 units	Density: 1600/6250 RPI Capacity: -total 280 MB or more	
(5) Line printer	1 unit	Speed: 600 LPM or more	
(6) X-Y plotter	1 unit	Image size: A1,A2,A3,A4 No. of pens: 8 or more	
(7) Graphic terminal	1 set	CPU: 32bit microprocessor Memory: 8 MB CRT-display: color 19" -Resolution: 1024 x 864 or more Keyboard, Mouse: 3 buttons Digitizer: -Image size: A2 or more -Resolution: 800dots/Sq inch or more -Functions of connecting with x.25 packet switching network -Operating and data communication system -Data base management systems -Language compilers -Software development support system -Management science system, others.	
(8) X.25 Gateway equipment	1 unit		
(9) Operating system and utilities	1 set		

EQUIPMENT LIST

Equipment	Quantity	Function and feature	Note
2. On-line PC for training (1) On-line PC (Trainees)	20 sets	<ul style="list-style-type: none"> • CPU: 16/32 bit microprocessor • Memory: 1 MB or more • Communications: LAN support • CRT-display: color 14" <ul style="list-style-type: none"> - Resolution: 640 x 480 or more • Keyboard, Mouse • Floppy disk drive: 1.2 MB or more • Hard disk drive: total 20MB • Serial printer: 200cps or more, 132ch/line 	Note: On-line PCs used in the other departments have the same functions and features.
(2) On-line PC (Instructors)	1 set	<ul style="list-style-type: none"> • Adding the following functions and features to above 2. (1) functions and features. • Hard disk drive: total 40 MB • Color printer: A4 or more 	
3. On-line PC for staff (1) On-line PC (staff)	4 sets	<ul style="list-style-type: none"> • Adding the following functions and features to above 2. (1) functions and features. • Hard disk drive: total 40MB 	
(2) Page printer	1 unit	<ul style="list-style-type: none"> • Size: A4 or more 	
4. Local area network (LAN : 3 segments)	1 set	<ul style="list-style-type: none"> • Speed: 10 Mbps • Access method: CSMA/CD • Cable: coaxial bus cable 	
5. Uninterruptible power supply unit (UPS) (1) UPS for center computer (2) UPS for on-line PC	1 unit 14 units	<ul style="list-style-type: none"> • Capacity: 20KVA, remote alarm function • Capacity: 1 KVA, to be able to connect 2 sets of on-line PCs. 	Note: UPSs for On-line PCs used in the other departments have the same functions and features.

EQUIPMENT LIST

Equipment	Quantity	Function and feature	Note
6. Spare parts	1 lot		
7. Maintenance tools	1 lot		
8. Installation materials	1 lot		
9. Documentation	1 lot		
10. Articles for consumption	1 lot		

EQUIPMENT LIST

VI. Administration and Support Department

Equipment	Quantity	Function and feature	Note
1. CAL (Computer Aided Learning) System (1) CAL terminal	4 sets	<ul style="list-style-type: none"> • CPU: 16/32 bit microprocessor • Memory: 1 MB or more • CRT-display: color 14" • Resolution: 640 x 480 or more • Keyboard • Floppy disk drive: 1.2 MB or more • Hard disk drive: total 20MB • Serial printer: 200cps or more 132ch/line 	
(2) Teaching materials making system	1 set	<ul style="list-style-type: none"> • CAL teaching material making functions 	
(3) CAL teaching materials (for 9 courses)	9 ses	<ul style="list-style-type: none"> • Outline of network design techniques • Outline of traffic theory • Basic techniques of digital switching • Optical fiber transmission basic techniques • Digital transmission techniques • Digital microwave transmission theory • Data transmission control procedure • Basic electronics circuits • Advanced electronic circuits 	
(4) UPS for CAL terminal	2 units	<ul style="list-style-type: none"> - Refer to Computer and Systems Dept. 5. (2) 	
2. On-line PC (1) On-line PC (2) Uninterruptible power supply unit(UPS)	2 sets 1 unit	<ul style="list-style-type: none"> - Refer to Computer and Systems Dept. 2. (1) - Refer to Computer and Systems Dept. 5. (2) 	

