

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

JUNE 1989

JAPAN INTERNATIONAL COOPERATION AGENCY

国際協力事業団

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PREFACE

In response to a request from the Government of the Arab Republic of Egypt, the Government of Japan has decided to conduct a Basic Design Study on the Project for the Expansion of the National Telecommunication Institute (NTI) and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Egypt a survey team headed by Mr. Akihiko MORITA, official of Grant Aid Division, Economic Cooperation Bureau, Ministry of Foreign Affairs, from 27 January to 24 February 1989.

The team exchanged views with the officials concerned of the Government of Egypt and conducted field surveys in NTI and domestic telecommunications organizations concerned. After the team returned to Japan, further studies were made. Then, a mission was sent to Egypt in order to discuss a draft report and the present report was prepared.

I hope that this report will serve for the development of the Project and contribute to the promotion of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of the Arab Republic of Egypt for their close cooperation extended to the team.

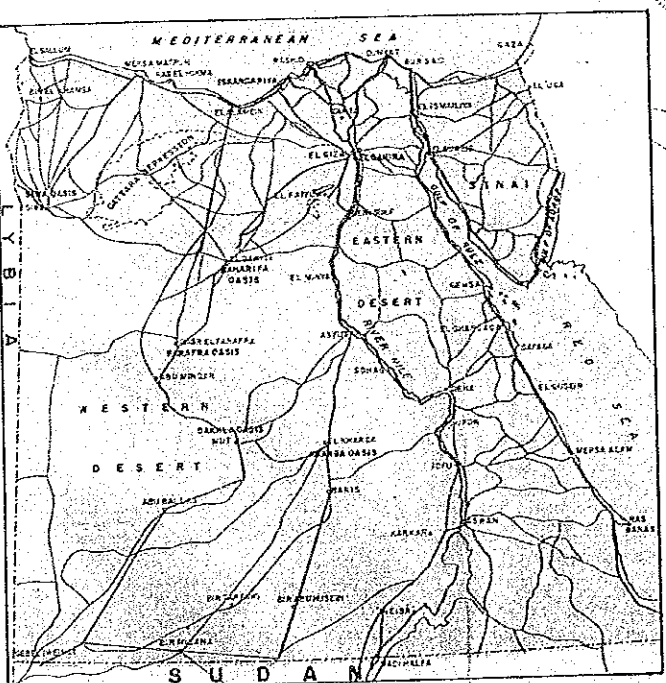
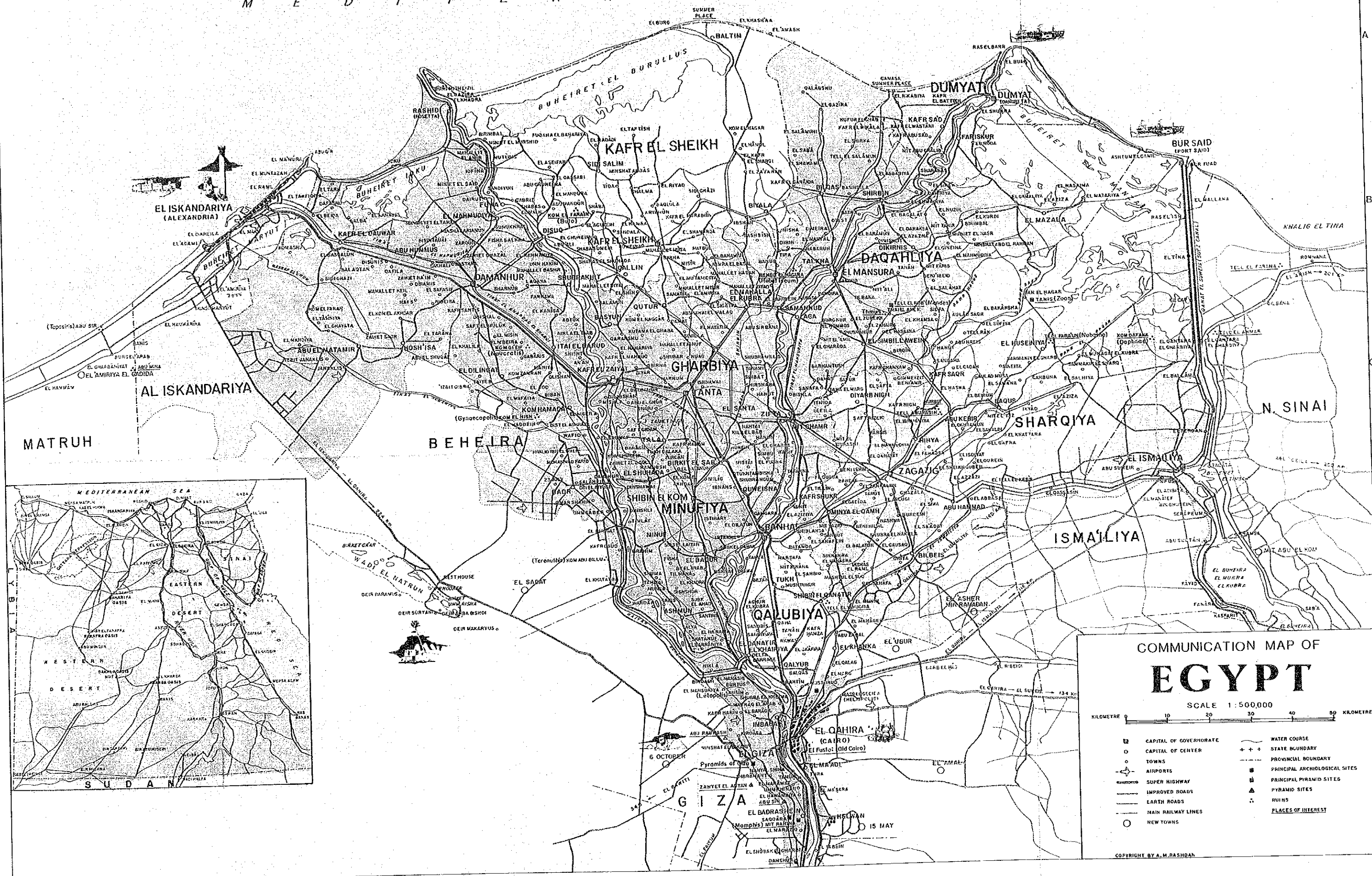
June 1989



Kensuke Yanagiya

President

Japan International Cooperation Agency



COMMUNICATION MAP OF
EGYPT
SCALE 1:500,000

KILOMETRE 0 10 20 30 40 50 KILOMETRE

<ul style="list-style-type: none"> □ CAPITAL OF GOVERNORATE ○ CAPITAL OF CENTER ○ TOWNS ✈ AIRPORTS — SUPER HIGHWAY — IMPROVED ROADS — EARTH ROADS — MAIN RAILWAY LINES ○ NEW TOWNS 	<ul style="list-style-type: none"> — WATER COURSE — STATE BOUNDARY — PROVINCIAL BOUNDARY ■ PRINCIPAL ARCHAEOLOGICAL SITES ▲ PRINCIPAL PYRAMID SITES △ PYRAMID SITES • RUINS • PLACES OF INTEREST
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SUMMARY

SUMMARY

Modernization and expansion of the telecommunications network and services in Egypt are crucial and urgent objectives for maintaining and enhancing its current and future domestic economic growth and its international relations through telecommunications services.

The Arab Republic of Egypt has been expanding and improving the scope of telecommunications services in its Second Five-Year Plan for Socioeconomic Development, viewing telecommunications as a prime impetus to the nation's socioeconomic development. For the time being, the nation aims at automating manual exchanges, digitalizing telecommunications networks through local production of digital exchanges, implementing packet switching services, and activating data communications services on the support of computers. In addition to the modernization and improvement of the telecommunications network and services, Egypt is pushing the number of telephone main lines per 100 inhabitants to 6.0.

On the basis of this conclusion, the Egyptian government issued Presidential Decree No.193 in 1983 to establish National Telecommunication Institute (NTI) as a key institute dedicated to training telecommunications engineers and supporting further growth of the nation's telecommunications technology. NTI is committed to:

- a) Training senior telecommunications engineers,
- b) Providing guidance and consultation to aid in the solving of technical problems facing the telecommunications organizations concerned,
- c) Conducting researches leading to growth of the nation's telecommunications technology,
- d) Acting as a telecommunications technology information center, and
- e) Contributing to promotion of regional telecommunications technology and services through acceptance of trainees from neighboring countries and technical exchanges with these countries.

NTI has taken over the facilities used by its predecessor, the Telecommunication Research Center (TRC). The Ministry of Transport, Communications and Maritime Transport, however, decided that the expansion of the facilities was indispensable for the achievement of the NTI's duties defined in the Presidential Decree. The ministry then developed an NTI expansion plan as a top priority task in the second five-year plan for socioeconomic development.

The expansion plan was budgeted by a sum of L.E.7,355,000 in the second five-year plan. A new building is now under construction on a site on the premises of the ARENTO (Arab Republic of Egypt National Telecommunications Organization) training center in Nasr City area in Cairo City. Interior works, including power and air-conditioning systems, are under way in the new building for completion in 1989.

The present training and experimental materials in the NTI's possession are insufficient in both quality and quantity for the fulfillment of the training and technical support functions defined in the Presidential Decree. So the Egyptian government has requested Japanese grant aid in connection with the expansion of the NTI's research and training equipment and facilities.

The request includes the telecommunications equipment and measuring instruments necessary for the execution of the functions of the following six departments --- five technical departments and one clerical division, or the Administration Department:

- a) Switching and Traffic Department
- b) Network Planning Department
- c) Transmission Department
- d) Electronics Department
- e) Computer and Systems Department
- f) Administration and Support Department

In reply to the request, the Japanese government conducted a project formation study and decided to execute a basic design study. In accordance with the decision, the Japan International Cooperation Agency (JICA) sent a basic design study team led by Akihiko Morita, official of the Grant Aid Division, Economic Cooperation Bureau, the Ministry of Foreign Affairs, to Egypt for 29 days from January 27 to February 24 1989.

The team talked with the representatives of the Egyptian government and conducted field studies. On February, a general agreement concerning this project was reached and minutes were prepared.

Through these field studies, the study team discussed, with the NTI members, the objectives of the training programs developed by NTI, contents and training methods in the training courses, and the actual activities in the technical support and cooperation for ARENTO and domestic telecommunications organizations concerned. Then the team adjusted the scale and contents of the equipment required to achieve the objectives of the NTI's activities. After coming back to Japan, the team analyzed the materials and information and decided the proper contents and scope of cooperation as follows.

- a) Equipment necessary for training in the Switching and Traffic Department

Digital switching system, traffic generators, measuring instruments, etc.

- b) Equipment necessary for training in the Network Planning Department

Traffic measuring equipment, computer-aided network planning system, personal computers for data collection and analysis, measuring instruments, etc.

- c) Equipment necessary for training in the Transmission Department

Digital radio communication equipment, fiber-optic communication equipment, PCM multiplexers, satellite communication receivers, measuring instruments, etc.

- d) Electronics Department

Computer system for designing printed circuit boards, printed circuit board fabrication equipment, various circuit experimental kits, measuring instruments, etc.

- e) Computer and Systems Department

Computer system and associated equipment, local area network (LAN) system, terminals (personal computers) for trainees and staff, etc.

- f) Administration and Support Department

Computer-aided learning system and texts, and personal computers for data base and job processing.

As for the equipment for the switching system and the transmission equipment, they are interconnected to enhance the capability of NTI as an integrated training center for modern telecommunications systems. The computer systems and personal computer terminals are interconnected through LAN to share the facilities and to enhance the training effect. The above training equipment is used in common for the technical support and research purposes.

The construction period of the above-mentioned equipment is scheduled as follows: 6 months for practical designing, tender, and contract; and 12 months for supplying and installing equipment; totaling 18 months.

The NTI training program consists of three main programs: the Continuing Education Program for basic and popularized training on the basic and new telecommunications techniques, the ARENTO Special Training Program for the education of ARENTO senior telecommunications system engineers, and the Telecommunications Diploma Course Program for the education of senior experts in each technical field of telecommunications.

Thus, the training program system is applicable to a wide range of training requirements, including basic training to expert education, in various relevant organizations. The team has concluded that NTI has enough capability to achieve the expected training objectives using the introduced training equipment because about 40% of the NTI technical staff have master's or higher degrees and NTI is planning to hire excellent staff at the college tutor or higher level.

In Egypt, leading governmental and private organizations have individual private telecommunications networks because of historical reasons, and NTI receives trainees from a wide range of those organizations in the country. Since the trained engineers go back to their own organizations and become leaders in the improvement of the telecommunications services, NTI will make a considerable contribution to the social welfare and economic development through establishment of technical bases and the improvement of the telecommunications services.

Also NTI is planning to receive trainees from neighboring countries from 1991/92 onward when facilities are completed. So, the contribution of NTI to the development of telecommunications in the neighboring countries through this international training activity can be expected.

It is extremely significant for Egypt to accomplish this project, from the viewpoint of educating people and improving the scientific and technical levels to establish the socioeconomic base of the country, through Japanese grant aid. To make grant aid cooperation more effective, technical cooperation is indispensable and its promotion is desirable.

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CHAPTER 1 INTRODUCTION

CHAPTER 1 INTRODUCTION

In the progress of expansion and modernization of telecommunications facilities, the Arab Republic of Egypt found that it was of an urgent necessity to educate senior engineers to be leaders in the field of telecommunications technology and to establish the foundation of telecommunications technology in Egypt. So it determined to expand the National Telecommunication Institute (NTI) in the Second Five-Year Plan for Socioeconomic Development (1987/88 to 1991/92).

The Egyptian government decided to prepare telecommunications facilities and to start important and urgent part of the NTI's functions, as promulgated in Presidential Decree No. 193 in 1983, by the end of the Second Five-Year Plan. For this purpose, the government appropriated a sum of L.E. 7,355,000 for the plan, secured a site in the training center lot of the Arab Republic of Egypt National Telecommunications Organization (ARENTO) in the Nasr City area in Cairo City, and started building construction in November 1986.

On the other hand, NTI had taken over most of its training and research equipment from its predecessor, the Telecommunication Research Center (TRC). The equipment was insufficient in both quality and quantity for the fulfillment of the NTI's functions as an institute of modern technology including digital and software technology. The Egyptian government decided to expand training equipment in NTI and requested grant aid of the Japanese government.

In reply to this request, the Japanese government dispatched a project formation study team at the end of October 1988; it decided to conduct a basic design study according to the result of the project formation study. So the Japan International Cooperation Agency (JICA) dispatched a basic design study team led by Akihiko Morita, official of the Economic Grant Aid Division, Economic Cooperation Bureau, the Ministry of Foreign Affairs, for 29 days from January 27 to February 24 1989.

The study team performed a field survey on the following: the present situation and future plan of the NTI's training and technical support activities and its future plan, kinds and functions of equipment necessary to implement the NTI's functions, equipment now possessed by NTI, situation of new building construction, present situation and future development plan of telecommunications in Egypt, socioeconomic development plan, and so forth, to decide the contents and the scope of the cooperation.

This report consists of the results of analysis and study of the information obtained by the field survey. Refer to the materials in the Annex for the organization of the study team, study schedule, list of interviewees, minutes of discussions, and so on.

CHAPTER 2 PROJECT BACKGROUND

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2.1 Socioeconomic Development Plans and Telecommunications

The long term socioeconomic development for the term of 1982/83 to 1991/92 in the Arab Republic of Egypt has been guided by three key principles.

The first principle is to "strengthen the ability of the Egyptian economy to finance its own development". Income from oil and tourism, remittances of Egyptians working abroad and Suez Canal tolls now constitute a larger portion of the total national income structure. This has left Egypt's economy more susceptible to external currents of change. To strengthen its ability to finance its own development, Egypt must increase the amount of goods it produces to reduce imports and enhance export potential. For enhancing goods production, productivity and quality of goods must be raised.

The second principle is "continuing to strengthen and reform the physical and social infrastructure". The goal is to raise the absorptive capacity of the national economy by providing an infrastructure that stimulates development and investment. Coordinated and balanced development of productive service, social service and goods production sectors will remain the firm basis for development efforts.

The third principle is the "population and regional dimension" of development. Egypt is obviously facing a population growth problem that will hamper development, if present rates and patterns persist. The responsibility for filling the basic needs of nearly 70 million people by the end of this century is fundamentally different from simply providing for quantitative change, since the type, nature and extent of Egypt's requirements will have changed. The socioeconomic development must be executed taking into account the distribution of manpower and production capabilities in a region.

The First Five-Year Plan for Socioeconomic Development, conducted from 1982/1983 to 1986/1987, had set real Egypt's GDP growth at 8.1% per annum on the average. It calls for higher savings ratios, increased investment, promotion of the agricultural and mining industries, refurbishing of the nation's infrastructure, strengthening of the energy and construction sectors, efficient fund applications for improving the nation's international balance of payments, and expanded productivity to attain this goal. Despite the fact that the plan was financed by as much as L.E. 3.64 billion for the five years, against the budgeted L.E. 3.44 billion, declining petroleum prices caused by the secondary oil-triggered crises had a dampening effect on the GDP growth, which remained only at 6.8% per annum on the average for the five-year term. In the meantime, the population had expanded by 1.32 million each year on the average, with the labor population showing an annual advance of 2.9% on the average with the unemployment rate rising from 4% in the initial year of the plan to 5.2%.

The Second Five-Year Plan that started in July 1987 has been proceeding on a socioeconomic development plan with emphasis on increased commodity production, higher productivity and product quality, enhanced export ability, project selection, and reinforced roles of private establishments in the manufacturing sector. In the industrial development field, the Second Five-Year Plan was concerned with expansion in productivity by viewing the last five years as a stage of preparing for long-term industrial activation, when compared with the exploitation of new industrial fields stressed by the First Five-Year Plan. Specifically, the plan aims at stabilizing the demand for domestic products and strengthening export competitiveness by identifying proper high-technology fields suited to the climate and conditions in Egypt, providing continuing education for industrial workers, developing abilities to keep pace with changing needs, and promoting industrial standardization and quality assurance of products in different industrial fields.

A summarized description of the features of the new Five-Year Plan is as follows.

- a) The annual average GDP growth rate in real terms for the five-year term is 5.8%, a moderate goal when compared with the planned goal (8.1%) set for the First Five-Year Plan.
- b) The growth in production is anticipated to be as high as 8.4% in the manufacturing sector, against low 2.3% for the petroleum sector.
- c) Planned investment totaled L.E. 46.5 billion for the five years, up 31% over the preceding plan, 38% of the total is catered by private sectors (against 23.3% previously), thus placing much expectation on private power.

Long-term outlooks as far as the year 2002 put the annual average GDP growth rate at 6.0% during the third five-year term and 6.4% during the fourth five-year term. The plan calls for industrial production to be increased 400% in the year 2002 from its level in 1986/1987, commanding more than 25% (17% in 1986/1987) of total GDP.

Telecommunications has been thought of as an essential factor of Egypt's infrastructure. A five-year telecommunications expansion plan has been developed in the nation's socioeconomic development plan. As a result of major investment for improved connection rates, less delays in telephone installation, and facility expansion during the First Five-Year Plan, the switching capacity has been expanded from 532,000 lines (479,000 subscribers) at the start of the plan to 1,443,000 lines (1,045,000 subscribers) at the end of July 1987, the last year of the plan, a 2.7-fold expansion. In capacity terms, the number of main lines per 100 inhabitants, or telephone density, achieved a drastic leap from 1.2 in 1983 to 3.0, contributing to drastic cuts in the 20-year backlogs of subscriber telephone installation in the cities of Cairo and Alexandria. The Egyptian government expects to boost the density to 6.0 and eliminate delays in telephone installation completely by the year 2002 or the end of the fourth

five-year plan by providing continual investment in the telecommunications fields.

2.2 Present Status and Tasks of Telecommunications

2.2.1 Supervisory Ministry and Administrative Structure

(1) Supervisory Ministry

Public telecommunications service in Egypt is primarily governed by the Ministry of Transport, Communications and Maritime Transport, under whose control come such establishments related to telecommunications as the Arab Republic of Egypt National Telecommunications Organization (ARENTO), a public communications service structure; the National Telecommunication Institute (NTI), a national institute dedicated to research, training, and information services in the telecommunications fields; and the Egyptian Company for Manufacturing Telephone Instruments, a manufacturer of telecommunications equipment, such as telephone sets and exchanges. The ministry administers the postal service, too.

(2) Administrative Structure

1) Outline of ARENTO

Domestic and international public telecommunications services are placed under uniform management from ARENTO, which was established in 1980 when the Arab Republic of Egypt Telecommunications Organization (ARENTO), which was instituted in 1957 as a public telecommunications division of the Ministry of Communications, was separated from the ministry in accordance with Law No. 153 (Telecommunications Public Corporation Law) and incorporated as an independent administrative structure. The law prescribes five major objectives for ARENTO as follows:

- a) Construction of a nationwide telecommunications network
- b) Provision of wired and wireless telephone services
- c) Maintenance and administration of facilities and equipment relating to the provision of services
- d) Implementation of projects needed to achieve the above goals and improvement of services to meet international standards
- e) Cooperation with foreign countries and international agencies

2) Organization of ARENTO

ARENTO is managed by the Board of Directors, the Directors Council, and the Chairman of Board of Directors appointed by the Presidential Decree. Under the Chairman are appointed three Vice Chairmen responsible for project execution, for operation and maintenance, and for financial, administrative and commercial affairs. ARENTO is organized into nine District Telecommunications Bureaus to undertake regional subscriber services. Figure 2.1 is the organizational chart of ARENTO.

Table 2.1 breaks down the personnel working for ARENTO as of December 1988. ARENTO employs about 23,000 technical members, including engineers and technicians, which number accounts for about 40% of the total staff.

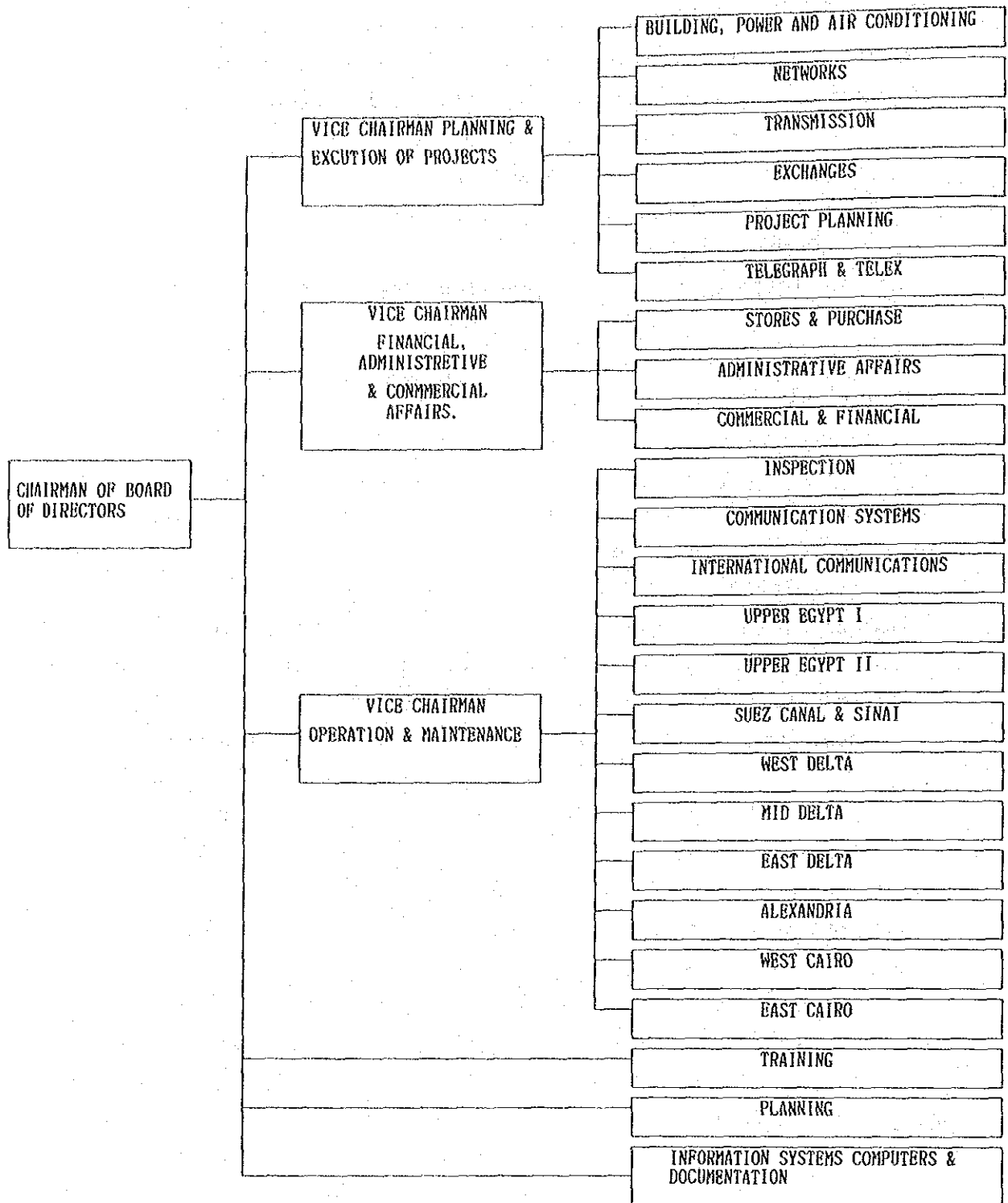


Fig. 2.1 ARETO Organization Chart

Table 2.1 Present Staff of ARENTO

as of Dec. 1988

Class of Staff	Number of staff
Engineers	1,403
Technicians	21,176
Administration	1,033
Clerks	5,690
Skilled Workers	14,924
Unskilled Workers	10,831
Total	55,057

3) Training at ARENTO

ARENTO staff training has been conducted at the ARENTO Training Center and NTI. Training for technicians is conducted at the ARENTO Training Center and that for engineers is conducted at NTI. The ARENTO Training Center in Nasr city is equipped with analog exchanges, transmission and radio facilities, telex terminals, manual exchanges, cable facilities, and a foreign language training system to provide basic education and retraining in maintenance and operation for technical staff and telex operator training and clerical staff training. About 2,500 technical and clerical staff members are being educated here each year.

4) Financial Situation of ARENTO

In fiscal 1987/1988, ARENTO registered total revenues of L.E. 616,783,000, against total expenditures of L.E. 373,744,000, with a difference of 243,039,000 and a post-interest profit of L.E. 105,294,000. The 1988/1989 budget anticipates declines in the international telephone, telex, and telegram revenues, a substantial fall in the post-interest profit to L.E. 45,069,000. Table 2.2 gives breakdowns of the revenues and expenditures in both fiscal terms. Apparently from this table, 61.1% of the revenues in fiscal 1987/1988 came from international telecommunications services, while only 37% from domestic telecommunications services. This is probably because a quasi-fixed rate system is used for telephone calls, whereby an annual connection charge applies to local calls not exceeding 1,500 units per year and calls above 1,500 units are also held to as low as L.E. 0.05 per 6 minutes under governmental guidance to keep telephone rates and other public charges low.

Table 2.2 ARENTO Revenues and Expenditure

(x 1000 LE)

Revenues/Expenditure	1987/88 Result	1988/89 Budget
(Revenues)		
/		
Domestic Telephone	217,543	242,000
Telex	8,639	8,700
Telegraph	4,041	4,600
International Telephone	293,244	210,813
Telex	55,525	36,000
Telegraph	3,461	3,100
Miscellaneous	23,780	22,000
Others	10,559	8,000
Total	616,783	535,413
(Expenditure)		
/		
Personnel	112,662	112,319
General Expense	30,950	41,500
Depreciation	145,912	150,000
Others	84,220	3,555
Total	373,744	307,374
Income Before Interest Charges	243,039	228,039
Interest Charges	137,745	182,970
Net Income	105,294	45,069

2.2.2 Features of Egyptian Telecommunications Networks

One feature of the Egyptian telecommunications networks is that governmental organizations and private companies in need of modern telecommunications services have built their own telecommunications networks, such as cable and microwave networks, since Egyptian public telecommunications has been traditionally underfinanced. From 1962 to 1979, a total investment of 4,640 million dollars was needed but only 20% of the amount was actually funded. This deficiency resulted in such a significant amount of telephone installation backlogs with growing population and urbanization that one fourth of the exchanges and half of the local communication cables in the city of Cairo were waiting for replacement or renewal as the facilities were aged.

At present, the army, police, governmental organizations, such as the Electricity Agency, Radio and TV Union, national railway, Social Insurance Organization, and Suez Canal Agency, and leading private enterprises, such as petroleum firms and banking institutions, maintain and administer their own telecommunications networks. Being also major users of telecommunications, these entities narrow ARENTO's revenues, or make its adequate equipment financing difficult. However, the use form of those private networks is changing according to the development in public telecommunications networks. In considering the development of telecommunications in Egypt, it is important that the public telecommunications networks are expanded in due consideration of the needs of the organizations which use those private networks.

Another feature of the Egyptian telecommunications networks is the coexistence of the facilities of many nations, such as Sweden, West Germany, the U.S., France, and Japan, due to Egypt's dependence on foreign funds to finance its networking endeavors. For example, more than 10 types of automatic exchanges have been installed in Egypt. Table 2.3 lists the exchange models and countries. As for transmission systems, manufacturers of Sweden, U.K. and West Germany are leading coaxial cable manufacturers, while manufacturers of West Germany, Japan and Italy are major microwave equipment manufacturers.

Satellite communication earth stations are monopolized by a Japanese manufacturer. Optic junction cable transmission facilities in the city of Cairo are the produces of a U.S. manufacture. The intermixture of varied facilities adds to the complexity of their maintenance because of learning different maintenance and operation techniques for every product, giving rise to interface technology problems, and associated service problems. Table 2.4 gives estimates of the market shares of the exchanges and transmission facilities by countries as of 1987.

In the exchange division, the Egyptian government contemplates to start local production of digital exchanges soon to standardize exchanges and thus do away with the the problems of the intermixture of many, varied models. Local production, when started, will make for further progress towards the digitalization of telecommunications networks as standardized exchanges penetrate the nation of Egypt.

Table 2.3 Existing Exchanges in Egypt

Exchange type		Country
Cross-bar exchange	ARF	Sweden
	ARE	Sweden
	ARM	Sweden
	C400	Japan
Analog electronic exchanges	No. 1 A	U.S.
	EWSA	West Germany
	PRX1A	Netherlands
	11F	France
	ND-20	Japan
Digital electronic exchanges	EWSD	West Germany
	E10 A	France
	AXE 10	Sweden
	NEAX 61	Japan

Table 2.4 Estimated Market Shares of Exchanges and
Transmission Facilities by Countries

(1) Local exchange (number of lines, as of June 1987)

Sweden	33 %
West Germany	21 %
U.S.A.	16 %
France	18.5%
Japan	9.5%
Netherland	2 %

Total	100 %
-------	-------

(2) Long distance transmission system
(number of channels x km, as of June 1987)

West Germany	42 %
Sweden	25 %
U.K.	21 %
Japan	12 %

Total	100 %
-------	-------

2.2.3 First Five-Year Plan for Socioeconomic Development

In 1973, the Egyptian government decided on drastic modernization of the Egyptian public telecommunications networks in recognition of the essential importance of modern public telecommunications services to the activation and growth of the nation's socioeconomic activities when it adopted an open economy policy to tide over the nation's economic crisis. To this end, the government developed a five-year (1979-1983) telecommunications construction plan encompassing regular construction schedules, plus new, urgent schedules. The plan was mainly aimed at reinforcing facility maintenance and restoring telecommunications facilities in the central city of Cairo. It involved replacement of local cables by West Germany, and automation of the Ramsis office exchanges by Sweden. As a result, the telecommunications functions in the central city of Cairo have been improved considerably.

Apart from this plan, the Ministry of Communications and ARENTO developed a 20-year (1980-1999) long-term modernization plan by having a survey conducted by a U.S. consulting firm with the USAID fund. This plan envisaged to increase the number of telephone lines from 376,000 in 1976 to 4.5 million by adding 4 million lines at the cost investment of 20 billion dollars over the 20 years, thereby raising the number of main lines from one or less to five per 100 inhabitants. This long-term plan was incorporated in the First Five-Year Plan for Socioeconomic Development that began in 1982/1983, with governmental financial aid. In pursuing this five-year plan, a plan was developed by ARENTO for each year on the basis of the five-year plan as a master plan, and fine adjustments were made with the plan for each year to reflect the results of the plan executed for the preceding year.

The First Five-Year (1982/1983-1986/1987) Plan for Socioeconomic Development involved a large amount of equipment investment to resolve major telephone installation backlogs, improve completed call rates and services, establish a sound finance structure needed to achieve continuous growth, and activate and streamline the ARENTO organization. The result was a drastic improvement in the nation's telecommunications services. For

domestic subscriber telephones, 1,043,000 telephone lines were installed and 184,000 lines were replaced, widening the telephone line capacity from 532,000 lines in the initial year of the plan to 1,443,000 lines at the end of July 1987, a two point seven fold advance, with the telephone density rising to 3.0 per 100 inhabitants.

Positive progress has also been made towards the automation in rural cities and improvement of automatic dial telephone services between cities with the completion of exchange offices in Beni Suef, Tanta, Kafr El-Sheikh, and other rural cities. A total of 1,620 coaxial cable lines were additionally installed, mainly in rural city routes, extending dial telephone services, available in 1980 in only a few cities, such as Cairo and Alexandria, to many other cities, offering the benefits of dial toll calls.

In the First Five-Year Plan, international telephone and telex services also witnessed a phenomenal improvement. International exchanges were added, augmenting the line capacity from 800 to 3,680 lines and offering automatic dial telephone services to 43 nations, against four previously. In the meantime, overseas transmission routes were improved for better overseas telephone services with the laying of Egypt-Greece submarine cables for communication between Southeast Asia and West Europe and the completion of ground routes for communication with Gulf nations and Asian nations. The telex exchange line capacity has been expanded from 5,820 lines in 1981/1982 to 9,340.