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No. 2056

Future of Electronic Industries in Egypt to 2000

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11 December 1979

NEAR EAST/NORTH AFRICA REPORT

No. 2056

FUTURE OF ELECTRONIC INDUSTRIES IN EGYPT TO 2000

Cairo AL-SINA'AT AL-ILIKTRUNIYAH FI MISR WA MUSTAQABALUHA HATTA 'AMM ALFAYN in Arabic 1979 pp 1-157

[Report: "The Electronic Industries in Egypt and Their Future Until the Year 2000"]

[Excerpts] The Presidency of the Republic

The Specialized National Councils

Electronic Industries in Egypt and Their Future Until the Year 2000

Cairo, 1979.

The National Council for Production and Economic Affairs

Report Presented to His Excellency the President of the Republic on the Electronic Industries in Egypt and Their Future Until the Year 2000.

Cairo, 1979.

In the name of God, the merciful and the compassionate:

His Excellency the President of the Republic,

A greeting blessed by God,

The National Council for Production and Economic Affairs is devoting special attention to studying the strategic industries in Egypt and to drawing up long-term policies to develop and enhance them and define their future until the year 2000.

The attached report deals with the electronic industries in their capacity as some of the fundamental mainstays of numerous industries, led by the telecommunications equipment industry and the war industries. The council's

Industrial Production Branch prepared a comprehensive study on these industries, assisted by the information and data available to it, and presented its study to the council. In the light of this study and of the opinions and proposals discussed by the council, this report has been prepared and I am honored to present it to His Excellency the President of the Republic on behalf of the council.

It is hoped that your excellency will examine the report and decide the recommendations that your excellency deems fit in this regard.

Central Supervisor of the Specialized National Councils

Muhammad 'abd-al-Qadir Hatim

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GENERAL REVIEW

This report includes five chapters that deal with the various aspects of the modern electronic industries in the countries that have achieved the peak of international progress, as in the United States and Japan, and in the existing Egyptian companies and with the rudimentary current position of the electronic industries in Egypt--the means for assembling recreational electronic equipment [sic]. The report also deals, in light of the various [words dropped] to correct its course and streamline its direction, to make it compatible with the rapid developments undergone by the electronic industries and the local market needs, in addition to the research centers of various levels, not only in terms of developing the electronic industries but also in terms of diversifying and improving the electronic products. The research and designing centers occupy a basic place in the production of the electronic industries. The centers top the elements of competition in the electronic industries and this is why a special chapter has been devoted to the electronic industries research centers in Egypt and to the means to benefit from these centers in the plan to develop this industry. The report also deals with the importance of training the second ranks of the electronic industry leaderships, namely the technical managers who shoulder the task of creativity and innovation in designing the production models. On the basis of the principles on which the Egyptian electronic industries must be founded, the report recommends the creation of companies for the production of industrial electronics, both for the purposes of producing the various means of communication and for the purposes of producing Arabic computers. The report also deals with the expected picture of the production of military electronics.

The current position of the electronic industry companies is considered marginal--a position that has not entered the sphere of the electronic industries yet. In terms of products, this position has not yet gone beyond the production of television and radio sets for the local market. In terms of industrial depth, the position is still in a rudimentary stage that lacks designing and innovation, even though a successful plan was carried out between 1960 and 1965 and led to starting the production of television models manufactured largely from local components and parts. However, elements beyond the control of the companies stopped this production and this depth has declined to the minimal degree, despite the large production volume--especially the production of television sets.

The first chapter deals with the various sections of the international electronic industry and with the extent to which electronic equipment has permeated all aspects of life.

Even though the historical beginnings of this industry were in the sphere of telecommunications, the industry gradually entered the individual's public and private life and has become a mainstay of information by television and radio and an instrument of recreation, such as the video equipment for recording both image and sound.

One of the basic fields of the electronic industries is the field of the war industries which has extended to include the management of military defense operations. Radio and missile networks and air defense units all rely on electronic communication equipment and on electronic computers. Moreover, superiority in the air force has come to rely on sophisticated electronic equipment capable of performing from within the aircraft all the reconnaissance and missile-launching operations performed by the ground networks.

Modern war has assumed a fundamental electronic quality. The large-scale use of electronic equipment has opened the opportunity for the use of space for offensive war and for disrupting communications and reconnaissance, in addition to the fatal nuclear radiations discovered by man.

Electronics also play a major humane role. They have supplied doctors with the means to look inside the body, with numerous means for radiological diagnosis, with the means to bolster the senses, such as hearing [equipment] and, shortly, with the means to make up for the loss of eyesight and even with heart pacemakers.

Electronics also play a role in the transport movement, both by road and by railroad. The latest inclination is the introduction in the future of electronic devices to control car equipment and to regulate fuel combustion and cooling through the use of a small electronic computer. There are other details, many of which are covered by the first chapter.

Technology of Modern Electronics

The diversity and development of electronic production relies on a technology that has developed qualitatively in rapid succession. The electronic equipment industry used to rely on basic electronic components or equipment consisting of the production of various resistant units or capacitor units, air coils [al-milaffat al-hawa'iyah] or coils with iron chests. The production of electronic equipment from these components was achieved through the use of the electronic valve as the basis for the electronic circuits. The equipment produced was voluminous and placed in chests that required ventilation and internal and external wire connections.

Then a sudden development occurred--a development which started in World War II--with the innovation of the transistor that has led to developing the theories of electronic designs by replacing the valve. The production of the basic electronic components has also developed in the direction of small size.

With continued development, it became possible to include most of the basic components and the transistor unit in a single cell. It then became possible to produce the electronic computer from several plates of semi-conductive materials assembled in a small box and carried in the pocket. The production of these [pocket computers] has been based on the so-called technology of merged cells.

The size of these computers developed further and became thinner and the technology came to be known as the "multiple merged cells." With still further development, the technology has come to be known as the "super-multiple merged cells."

The theory of manufacturing these cells from semi-conductive materials, such as silicon, is considered the basis for constructing the required electric circuit, whether for the purpose of making computation, for opening and closing operations or for hundreds of other electronic operations which constitute different stages in the various electronic computers which have capabilities in accordance with certain criteria.

The nature of this industry [computer industry] is different from the electronic industries, even though they all depend on utilizing the qualities of [certain] materials. However, the electronics technology has developed in the direction of:

A shift toward the use of electronics inside semi-conductive materials instead of confining the use to electrons released in vacuum within valves.

The use of surfaces with qualities different from those of the customary resistant units, the use of density units instead of the previous condensers and the use of conductive surfaces that merge the various elements within the micronic dimensions, i.e. within one millionth of a meter.

This is the nature of the modern electronics technology. The inclination of the electronics technology toward [the use of microns] must be stressed so that this use may extend to the various types of electronic production, even though there are still some types of production, such as radio transmitters, with a capacity exceeding (L.O.) that rely in their operation on the electronic valve and the separate electronic components.

The second chapter reviews electronic production and its companies in Egypt in the following manner:

Production and Future Needs:

Electronic production in Egypt has been confined to consumer commodities. The serious beginning started with the production of television sets, even though it was preceded by the production of radio sets--especially the popular models. However, the production of television sets to meet the beginnings of the television service needs constitutes the industrial start that depends on an acceptable degree of investment and on knowledge of a sophisticated industry.

The volume of what has been produced since 1960 and what is expected to be produced by 1980 amounts to 1,354,986 million television sets. The estimated average production in the 1977-80 plan amounts to 145,000 sets annually.

A study has been conducted to estimate the needs for television sets on the basis of the spread of cultural and information awareness in its capacity as the fundamental link resulting in the acquisition of television sets. These future needs are estimated at an average that starts with 160,000 sets in 1977, rising to 286,000 in [year indistinct], to 400,000 sets in 1990 and to 736,000 sets in the year 2000.

This means that the total number of television sets that have to be produced between 1978 and 1982 amounts to 1.7 million sets valued at 300 million pounds on the basis that 20 percent of the sets will be colored sets. The number that information [sic] will require by the year 2000 will amount to 8.5 million television sets.

The value of the production of television sets may amount to 35 million [Egyptian] pounds annually at the average, compared to 8 million pounds for the 1976 production.

If the loss in production resulting from the idle capacities is to be calculated, it is expected to amount to 8 million pounds annually.

Conditions of Electronic Production in Egypt:

Nearly 15 years have passed since the start of production in Egypt. However, this production is still at the same level with which it started. Despite the leaps made in the methods of production at the international level, the Egyptian companies have continued to operate on the basis of purchasing the electronic components, confining their industrial efforts to the operation of assembling and quality control. It is evident from the various chapters of the report that the integrated manufacturing of electronic equipment must be carried out in four stages. The most important in terms of the technical and economic impact are the stage of designing the products, producing the prototypes and constructing the components either through direct contacts with industrial companies or through the production of the special parts which constitute a distinctive section of the designing outfit.

This situation has led to developing the electronic equipment plants into a market for dissembled television and radio parts supplied by foreign companies at prices that obstruct competition and prevent the Egyptian companies from standing on their own feet. This is why the companies suffer from similar problems, the most important of which are:

1. Lower production than the actual production capacity due to the shortage of the production requirements consisting of component kits imported in hard currency.

2. High costs of assembling that raise the cost of the set, thus increasing the added value to 43 percent instead of the usual 30 percent.

It must be noted here that the steps to develop the production of television sets had reached in al-Nasr Television Company the point of producing nearly 70 percent of the components of each set. But the development was stopped for reasons beyond the control of the companies and these companies resumed the policy of importing component kits and closed their production units. However, they recently resumed the production of these components on agreement with a German company.

The general interest, both socially and economically, dictates preservation of the existing production units that are represented in:

1. Al-Nasr Television Company.

2. The Arab Transistor Company.

3. The Electronic and Electrical Equipment [Company] (Philips).

4. The Banha Electronic Industries Company.

An investment study conducted by the Industrial Sectors Industrialization Authority [title as given] recommends that the production of television sets be confined to the Arab Transistor Company and the Philips Company and that the plant for the production of television screens owned by al-Nasr Television Company be closed. This recommendation relies on some economic criteria contained in the chapter on the production of consumer electronic equipment. But the recommendation has not gone further to include a program to streamline or bolster this industry so as to eliminate the bottleneck this industry is experiencing, namely confining the industrial operation to assembling imported sets. This recommendation is remote from the industrial reform connected with the Egyptian development plans.

The future defined by each company in the form of plans, though indicative of the degree by which these companies have embarked on the development stage, is not enough to deal with the problem. The aspects of development are summed up in the following:

1. Establishing economic and industrial connections and coordination among the existing companies.

2. Speeding up the phase of terminating the importation of component kits and proceeding with all the phases of manufacturing in reliance on the aid agreements for full industrialization and on the efforts that can be made by the research centers, especially the Electronic Industries Research Center.

3. Devoting attention to the creation of middle-level technical leaderships with the abilities needed to take charge of the responsibility of designing and innovating in the sphere of the production of consumer electronic equipment.

The third chapter deals with the industrial electronics in the sphere of:

1. Producing telephone centrals and telephone communication equipment.

The Egyptian Company for the Telephone Equipment Industry was created in 1962 and started its production which consisted of:

First, public crossbar-type centrals and private centrals.

Second, telephone equipment.

The Egyptian Company relies on an agreement with the Swedish Ericson Company for technical aid. Its central and telephone equipment production capacity is determined in the light of the needs of the Communications organization [probably referring to the Arab Republic of Egypt Telecommunications Organization] which have been estimated at 30,000 lines for the public centrals, 10,000 lines for private centrals and 70,000 telephone sets. The rate of local manufacturing of the various products is estimated at the following:

Nearly 65 percent of the total value of the public centrals.

Nearly 60 percent of the total value of private centrals.

Nearly 84 percent of the total value of telephone sets.

The industrial depth achieved by the company indicates that it has followed a sound course in terms of national industrialization. However, the company's average [annual] production throughout the years of its existence has amounted to only 9,000 lines for public centrals. Moreover, the company has also suffered from the fact that the [telecommunications] authority has failed to pull out the company's production immediately or to pay its value at the right time. This indicates that a degree of the difficulties that have led to the deterioration of the telephone utility has been reflected on the company.

On the other hand, the company was receiving the technical information necessary for development and improvement from the Swedish Ericson Company but the unavailability of investments did not help it to introduce the improvements. This has led to the continued production of the old-type Crossbar centrals and has made it impossible to export this type of centrals to many neighboring countries.

2. Embarking on the production of Electronic Centrals [telephone exchanges]:

Enormous developments have been witnessed in the production of communication networks and these developments underline two directions in the production of equipment:

First, a shift from the system of automatic telephone communications to the use of equipment based on electronic inventions and on control that leads to selecting the wanted subscriber by computers.

Second, external communication between subscribers to the automatic telephone exchange and the public centrals will use a cable network smaller than that used presently, thus leading to the inclusion of numerous telephone communications (subscribers) in one telephone channel. Therefore, there will be a dire need for the production of multiplex equipment [ajhizat al-tadmin] in the efforts to develop telephone communications generally.

An estimate of needed the telephone lines indicates that the number will rise from the 150,000 lines needed in current years to 250,000 lines in 1984 and to nearly 300,000 thousand lines annually by the end of this century.

The need for telex equipment will also increase to reach 10,000 machines by 1980. We must also take into our account that the networks to transmit the information needed for performing public services or for connecting numerous utilities raise the value of the various types of communication equipment that has to be produced. This value has been estimated in the telecommunications chapter at the equivalent of 250 million dollars annually. This figure calls for:

First, developing gradually the current type of centrals produced into the new electronic types and raising the production capacity so that it may meet the local needs.

Second, beginning a new industry to produce the various types of electronic communication equipment needed for the communication networks outside the centrals.

3. Arabic-Language Electronic Brains and Computers:

The chapter concerning industrial electronics deals with--in addition to entering the field of the communication equipment industry--the production of electronic brains and computers, especially Arabic-language computers,

especially Arabic-language computers, to meet the general development requirements that have been and will continue to be faced by the Arab countries.

General development or civilizational growth depends on the use of electronic brains in endless spheres of life. The future indicates large-scale growth in the use of small-size electronic brains. The production of such equipment for daily use in home life is almost realized. There are even indications that the car industry will resort to such electronic brains to control car operation and to meet the increased need for the economical consumption of fuel.

The use of electronic computers and brains in fundamental spheres has been delayed in the Arab countries because of the dire need for brains that write and store data in Arabic.

The chapter concerning this issue contains details of the technological progress in accordance with which electronic computers and teleprinters and similar telegraph equipment has been adapted to use Arabic and details on how Arabic is more suitable for such use.

This is why the feasibility of the plan to produce Arab-language electronic computers and brains is proven by a mere examination of the requirements of civilizational progress in the Arab countries.

The fourth chapter of the report deals with the military electronic industries in the following manner:

1. The goals of the military electronic industry:

This industry seeks to produce the electronic equipment and systems necessary for the military hardware used by the various branches of the armed forces (the army, the air force, the air defense, the naval forces and reconnaissance).

These systems and equipment are so numerous and cover all spheres and branches of the electronic sciences. The most important types of electronic equipment are summed up in the following:

Equipment for radio communications and data transmission over various wave lengths.

All types of radar equipment.

Various kinds of missile guidance and control equipment (surface-to-surface, surface-to-air, air-to-air).

Navigation equipment for military aircraft.

Electronic jamming and electronic counter measures.

Electronic monitoring and direction finding equipment.

Night vision equipment.

(Heat-seeking) electronic heads and other equipment.

These types of equipment are divided according to the nature of their use. There is ground equipment, equipment filled into aircraft, missiles or ships.

Special position of military electronics industry in Eygpt:

Egypt waged in 1967 and 1973 wars whose main feature was that of an electronic war. This made it necessary to enter the sphere of producing the equipment for this war, especially since acquiring such equipment from foreign sources has become subject to political relations and since it is very expensive.

The production of military electronics requires industrial precision and a quality standard higher than that of any other electronic product. This is why the units for this production are considered a factor for raising the quality standard of the production of civil electronics.

Military Electronics and Banha Electronic Industry Company:

The plan to produce modern electronics started with the creation of the Banha Electronic Industries Company. Even though the company was founded on this basis, it turned in its early stages toward civilian production consisting of recreational equipment. It then started to produce some communication equipment for the armed forces. Therefore, the company should be provided with all the components of military electronic production, whether in terms of equipment or in terms of personnel, on a firm and scientific basis of cooperation with foreign sides that are advanced in this sphere of production. Such cooperation must be stipulated in all the contracts for the importation of weapons for the armed forces.

Al-Nasr Television Company started as of 1967 to assemble some types of military communication equipment and is still specialized in the production of some of these types.

In the fifth chapter, the report reviews research and training in the electronic industries and provides a description of the applied and basic research centers, explaining the positive and the negative aspects. The applied research centers are characterized by having good laboratory equipment while lacking researchers and skilled labor due to the migration of workers either to the Arab countries or to other work sectors.

There should be a special cadre for the applied research similar to the cadre of the universitieis, taking applied research into consideration at time of promotion. The basic research centers are characterized by having well-prepared scientific persons while lacking proper laboratory equipment.

The report also explains the current spheres of work of each of the applied and basic research centers and points out that the basic research centers focus on theoretical research theses and that the researchers conducting such studies are selected according to their scientific qualifications.

The report stresses the importance of coordinating the work of the various applied and basic research centers, pointing out the distinguishing features of each of them. The report also explains the distribution of work among the research centers under the control of the service sectors and the research centers and units under industry's control.

The report also discusses the importance of training and of giving [college] graduates the largest degree of knowledge with modern developments, of underlining scientific knowledge, of providing laboratories, of conducting experiments, of kindling interest in electronics and a spirit of scientific competition as of childhood and of preparing the electronic parts market to make it compatible with these goals.

Kindling an interest requires organizing the hobby of amateur radio operation and forming scientific societies in schools and universities.

CHAPTER ONE: ELECTRONIC PRODUCTS AND TECHNOLOGY

Estimate of Investments in Electronic Equipment in Egypt by Year 2000:

An estimate of investments in electronic equipment in Egypt in the year 1985 can be built on the basis of the international population average. The estimate of these investments in the year 2000 can be based on quadrupling the investments in a period of 15 years.

The international investment in 1985 will amount to 200 billion dollars, as already stated. Earth's population in that year will amount to nearly 4.5 billion people, at an average growth rate of 2.5 percent. If Egypt's population in 1985 is estimated at 43.5 million people (at the said growth rate), then the investments are estimated at nearly $200 \times \frac{43.5}{4500}$ or the equivalent of nearly 2 billion dollars (equal to about 750 million Egyptian pounds at the official exchange rate). In the year 2000, these investments will rise to 3 billion pounds.

If it is estimated that the local plants will produce only 25 percent of the electronic equipment in the republic in 1985 and 75 percent of this equipment in the year 2000, then the value of investments in electronic equipment will amount to nearly 200 million Egyptian pounds in 1985 and 2,225 million Egyptian pounds in the year 2000.

Estimate of Investment for Electronic Components in Egypt in 1985 and in the Year 2000:

The same method of estimate followed in the preceding part can be followed here. Therefore, the estimate of investments in electronic components amounts to nearly $45 \times \frac{43.5}{4500}$ of nearly 450 million dollars (the equivalent of nearly 170 million Egyptian pounds) in 1985 and nearly 700 million Egyptian pounds in the year 2000.

Investments in electronic components industry will amount to nearly 50 million Egyptian pounds in 1985 and 500 million pounds in the year 2000.

CHAPTER TWO: ELECTRONICS INDUSTRY IN EGYPT

Beginning of Electronics Industry in Egypt:

Tangible electronic production Egypt started with the production of television sets when it was decided to introduce the television service to the new regions of the United Arab Republic at the time. As a basis for the growth of this service, it was decided that it was necessary to manufacture television sets locally. This production started in al-Nasr Company in stages which took 4 years. The rate of [local] manufacturing of the sets amounted in 1964 to nearly 75 percent of the components of the television set. This industry was coupled with units for the production of various parts of the set, namely:

1. Units for the production of electronic components such as the channel selector, the loudspeaker, the transformers and the various coils.

2. A plant for the production of compressed wood cabins and polyester paint.

3. A plant for the production of screens.

4. A plant for the production of instruments for cutting and molding metals by pressure.

It was hoped that the policy of real industrialization in this plant would advance to the point where the plant would produce completely various models of television sets. The plant did actually reach at an early stage, in 1965, the point of producing a transistor television, thus scoring progress that had not been made by many of the major international factories yet.

The experiment of introducing the electronic industries started in a scientific and alert manner through al-Nasr Television Company which was controlled at the time by the culture and information sector. This experiment, which lasted only 5 years, made it possible to provide training and experience to a vast generation of engineers and skilled workers. The experiment was even tantamount to opening the door for the first time for the Egyptian women graduating from high school to work in an industrial craft compatible with her nature--a craft in which she achieved considerable success.

The experiment of manufacturing television sets by an industrial company was tied to a national direction embodied in enabling this industry to take into account the conditions of the television service in the country so that its costs may not constitute a burden to the state, whether in terms of the expenses of transmission and of program production or in terms of the expenses of receiving this service in homes, by producing television sets affordable by the Egyptian masses.

This is why the task of this industry was to make a profit capable of covering the costs of television transmisision and, at the same time, to produce reception sets sold at prices within the purchasing power of the majority of the Egyptian people. The experiment succeeded in securing a television service that lasted for a period of time, realized economic independence and did not saddle the state with the burdens of financing it. The experiment even led to a situation which will undoubtedly push this industry toward progress and excellence under the impact of the direct economic link between television sets and financing this service--a link that creates an interaction between the service product through the sale of larger numbers of sets and the use of the profits from sales to improve the television service, thus creating constant progressive motion.

The television industry then followed the course that the authorities concerned started implementing in the phase which started around 1965--namely the course of reduced production and higher prices. This led to hampering the Egyptian television industry because it forced the industrial capacities achieved in an atmosphere of enthusiasm and security to go idle as a result of the reduced production adopted by the state plans and of the restrictions imposed by those plans--restrictions that made it impossible to acquire in an uninterrupted manner the raw materials or the basic parts needed for production.

Comprehensive Picture of Electronic Equipment Industry in Egypt Since 1965:

The state's general plan has obstructed a sound industrial growth of the electronic industries. The situation in the various electronics plants reached the point where production is concentrated in four major plants, namely: Al-Nasr Television Company, Telemisr Company, Philips Company and Banha Company. These companies focus on the production of consumer electronics, the most important being radio and television sets. The industrial dimension has been confined to assembling these sets from imported kits because the aforementioned causes have made it impossible to proceed with the plans for industrial depth. Moreover, transactions and deals were confined to the eastern bloc countries, with the exception of Philips Company. The nature of the structure of the Philips Company requires it to obtain its needs from the foreign [mother] company with the capital, namely the Dutch Philips Company.

[Words dropped] fully manufactured and the kit, causing it to be consumed by the costs of the production phase in accordance with the policy approved on the basis of manufacturing the various electronic components, such as resistors and capacitors, as a result of the change of the company's policy toward the easy assembly production or as a result of the inability of the equipment to keep up with the rapid development undergone by the electronic components industry.

Technical Evaluation of Electronic Equipment Industry in Egypt and Complete Picture of Electronic Equipment Industry:

The manufacturing of the various electronic equipment, whether recreational or for communication purposes, takes place in the following stages:

A. The industrial designing sections shoulder the responsibility of designing equipment to perform various functions according to special computations. The designing phase does not end at this point. Rather, prototypes for this equipment have to be built in special prototype workshops and various experiments and measurements have to be carried out to prove the compatibility of the prototype produced with the specifications on whose basis the previous computations had been made.

B. Electronic equipment usually consists of basic components and of special components. The basic electronic components are produced by specialized factories and there is no need for these factories to belong to the electronic equipment factories. As for the special components which are connected with the type of the piece of equipment and the method of its design, these are usually manufactured by the electronic equipment plants themselves. Consequently, the phase following the prototype production phase is that of importing the basic components from the specialized plants and of arranging for the production of the special components in the plant which has the right and the concession to manufacture the piece of equipment to be produced.

C. The third phase of production is to arrange for production lines prepared to synchronize with the phases of assembling the equipment from the basic and special components already supplied with a regularity compatible with the production program.

D. The fourth and final phase is the phase of quality control, reliability, durability and other specific limits set to determine the suitability of the equipment--a suitability connected with the type and place in which the equipment is used and the purpose for which it is used.

These four stages constitute the mainstays of the electronic equipment industry. Even though the four stages are integrated and have their impact on the standard of the product, the first stage which pertains to designing and building a prototype is considered a definite element in achieving success

and excellence by the various electronic equipment factories. Such excellence and success depends on the ability and skill of the designers and inventors of the various kinds of equipment. This class of industrial men is considered a mainstay of the industrial depth. However, such capabilities require superior education. What is more, such men gain their experience in the various methods of designing from specialization and practical industrial experience achieved through their work in the basic units of the electronic equipment industry. Companies consider the patents of the equipment produced an industrial right and a secret that is not given away without a contract and in return for the payment of rewarding sums of money. The industrial companies often decline to provide training on design work and refuse to let trainees into these sections.

The companies devote attention to attracting the skills capable of carrying out the task of production designing. A company does not keep the prototypes and specifications of the equipment it produces for more than one year, especially in the sphere of the consumer electronics.

The task of the designing sections also includes developing the equipment and making various modifications that lead to the performance of new services, to easier use and control, to higher performance efficiency, to higher efficiency in electricity consumption, to longer durability of the electronic components and to lower costs.

Method of Creation of Electronic Industries:

A developing electronic industry starts usually with the conclusion of agreements for the transfer of industrial knowledge. The equipment-producing companies refuse to have the transfer include the knowledge pertaining to the first [designing] stage. They usually agree to transfer the knowledge beginning with the third stage under which the component kits needed for the production of the piece of equipment are supplied. This means that the rights to know-how that are usually established through industrial agreements always take into consideration the interests of the original industrial company. These agreements withhold the rights to know-how that lead to technical or economic competition. The technical competition lies in the first stage, namely the stage of industrial designing, and economic competition is based on the second and third stages. As long as the [mother] company is the supplier of the component kits that will be assembled, it usually makes allowances for a margin of costs consisting of the difference between the price of the fully manufactured piece of equipment and the cost of the component kit--a margin usually consumed by the costs of the third stage in which the kits are assembled into complete sets on the production lines. The [mother] company confines the know-how right that it sells to the new company to just this stage of production. Thus, the sale price of the product assembled on the production lines of the new company has to be higher than the costs of the same product manufactured by the industrial company with the concession to produce the original piece of equipment. The mother company thus makes sure that it will face no competition in foreign markets.

Course of Electronic Companies in Egypt:

The electronic equipment industry in Egypt embarked on this stage by producing assembled recreational equipment and some types of communication equipment introduced recently.

Contracts were concluded for the transfer of the know-how concerning the assembling of television and radio sets with numerous international industrial companies in the east, the west, Japan and the United States. The same Egyptian company has vacillated between numerous foreign companies and has not kept its industrial relationship with a single company for a long and useful time that makes it possible to establish a firm relationship that creates a kind of trust and subsequently leads to the full transfer of the various stages of the industrial know-how. This happened to al-Nasr Television Company in its first production period between 1960 and 1965. The agreement it concluded with the American firm did not deal with the aforementioned conditions wherein lies the fear of competition between the original company and the competing [new] company. Neither Egypt nor the Arab countries were among the markets of the said American firm. Moreover, the agreement lasted for 5 years during which al-Nasr Television Company moved to the second stage of the industry, namely, the stage of arranging directly for its needs of the special electronic components. This was done with the assistance of the original firm which supplied all the equipment necessary for this stage, thus leading [al-Nasr's] industrial depth to reach 75 percent of all the industrial stages.

Al-Nasr Company also began to establish a section for design and development relying on Egyptian skills. The elements of the electronic equipment industry had been expected to be completed within a short period, were it not for the setback suffered by this company--a setback that buried those efforts.

The electronic equipment industry companies were given full protection based on banning the importation of recreational electronic equipment. This protection did not lead to any industrial progress in the stage of assembling sets from the imported component kits. The market for this kind of sets declined as a result of the restrictions imposed on importing the components from any country other than the agreement countries.

Production of Some Communication Equipment:

The policy of reduced production of the recreational equipment gave some companies the cause to turn to the production of some types of communication equipment for the armed forces, following the same method of complete component kits and of confining the efforts to the process of assembling on the production line.

As a result of this inclination, some of the following types of equipment were assembled [locally]:

A. Walkie talkies for the armed forces.

B. Landline carriers for the armed forces.

C. Some types of loudspeaker equipment.

Open-Door Policy and Its Impact on Electronic Industries:

As a result of the open-door policy and of the accompanying facilities given for the acquisition of hard currency by way of the collateral market or by way of importation without currency conversion, the trade of importing foreign-made electronic equipment started for the first time after a long period. Even though the state has imposed high customs fees on such importation with the aim of protecting the locally assembled production, the electronic equipment industry companies have begun to feel some sort of competition from the imported equipment, especially equipment imported from Japanese factories. Even though the imported models were produced locally, the difference [presumably in price] between the local product and the similar imported product has not been sufficient to give preference to the local production.

The customs fees have been raised to nearly 250 percent and this must inevitably provide high customs protection. This is in addition to imposing the incentive price for hard currency. This has, naturally, enhanced the ability of the local industry to face the imported equipment--that is if it is imported officially. This ability is evident in the vast difference in the price of the colored television sets produced by the local factories and the price of those imported from abroad.

This protection that has been given to the local production has not led to enhancing the industrial depth of the electronic equipment. On the contrary, the electronics companies have taken advantage of the protection to reduce the local manufacturing process which started with the importation of electronic component kits [and assembling them locally] to the importation of semi-manufactured sets which have led to higher profitability as a result of:

1. Reduced assembling costs and increased profitability.

2. Increased production creating the conditions compatible with the elements of disbursing top incentive rewards to the workers of these companies.

Consequently, a kind of superficial industry has started in some of the electronic equipment companies that supply foreign products which they import semi-manufactured so as to avoid paying the high customs duties and to take advantage of the high profit margin consisting of the difference between the cost of the importation of a fully-manufactured set and paying the high customs fees and the cost of importing a semi-manufactured set at very small customs fees and assembling it at a small cost on the company's production line.

Evaluation of Position of Electronic Industry Companies:

A. All the factories suffer from surplus production capacity and weak productivity. The reasons are due to meager hard currency allocations for the importation of components. This has caused the industry to be unable to meet the local needs and has created a black market for both imported and local equipment.

B. Even with providing the hard currency allocations needed, some production capacities will remain idle as a result of the future expansion plans and of the fact that these capacities exceed the local needs.

C. The low quality will deny the local production the ability to compete. It also encourages importation. When the high assembling cost is added, the inability to export to the free markets, such as Saudi Arabia and others, becomes obvious.

The attached list demonstrates the production volume, the value of labor and the added value and shows that the total loss in the added value at the national level is as follows:

Al-Nasr Electronic Equipment Company	2,170,000 pounds
The Arab Radio and Transistor Company	2,170,000 pounds
Al-Nasr Television and Electronic Equipment Company	3,250,000 pounds
Banha Electronic Industries Company	397,000 pounds
Grand Total	8,837,000 pounds

This means that the total loss in the added value amounts to 8,377,000 pounds annually [figures as published].

Electronic Industry Companies in Egypt:

Banha Electronic Industries Company: It is located in the town of Banha [al-Qalyubiyah Governorate] on the Cairo-Alexandria Agricultural Road and is built on an area of 120,000 square meters. The area of the main building which includes the workshops and the production halls is nearly 40,000 square meters. Attached to the main building is the multi-story building which contains the research and development laboratories and the designing, industrial engineering, testing and quality control sections.

The original project was implemented by the Czech Tesla Company within the framework of the Soviet [sic]-Egyptian cooperation at the time.

The original project includes the production of the following equipment:

A. A total of 40,000 television sets annually.

B. A total of 100,000 home receiving sets annually.

C. A total of 2,000 special transmission and receiving sets for military purposes.

The final stages of production included the production of electronic parts, valves and transistor s sufficient to meet the need of high [the need of the existing] sets, in addition to the production of coils, transformers, mechanical and plastic parts and printed circuits.

All the equipment necessary for these workshops, including a workshop for the production of the special instruments needed for quantitiative production and the workshop for electrical painting, has been delivered.

The plan also included equipping the multi-story building with the laboratories needed for technical control of the electronic parts, the industrial engineering laboratories for operating the components and the parts [sic], the equipment and the chemical laboratories needed to test the raw materials and the solutions, to conduct material research and to replace the raw materials in the future, and the measurement laboratories. With the start of construction, the project also devoted attention to building the electronic equipment designing sections so as to encourage local designs.

The electronic parts which the project was prepared to produce are:

A:

1. Carbon resistors.

2. Cable resistors.

3. Variable resistors.

B:

1. Ceramic capacitors.

2. Mika capacitors

3. Chemical capacitors.

4. Paper capacitors.

This is in addition to the valves and the transistors to which we have already referred. The thought given to establishing this project accompanied the comprehensive industrialization movement in the Egyptian republic in the late 1950's and early 1960's. One of the most important goals of this movement was to provide full employment. This is why the project's prevalent pattern was to use as much labor as possible. This was evident in the method of the production of electronic parts.

The implementation of the project was postponed for several reasons and the company did not start producing electronic parts until the beginning of 1969, valves until 1970 and transistors until 1971.

The project's connection with the eastern bloc had its major impact on curtailing the Banha Company's share of local market sales, whether in terms of home receiving equipment or in terms of television sets. This small share resulted from the connection of the other companies--al-Nasr, Telemisr and Philips--with the western companies at the time. This was the cause of the company's poor economic position at the outset of its foundation, not to mention the psychological impact and the tension that afflicted the management.

Therefore, perhaps the company will not proceed to the industrial stages that require greater local technical effort needed by this type of products.

After completion of the special equipment in 1970, the company started to produce special electronic equipment, beginning with a receiver-transmitter [walkie talkie] for military use on a special license given within the framework of the aforementioned cooperation. Contrary to what happened in regard to the home receiving sets and television sets, numerous factors acted together to enable this specialized production to start more successfully.

This success had its impact on the voluntary and involuntary transformation in the thought and efforts concerning the production of special electronic equipment, especially since this kind of production is distinguished by the high degree of technology it contains, a fact which stirred the ambitions of the company's engineering teams. This fact also led to better economics in comparison to the home equipment production which contains a small degree of technology that does not produce profitable economics through voluminous production [sic]. Thus, local participation in the production of special electronic equipment increased and the demands of the sides production of special electronic equipment increased and the demands of the sides using such equipment also increased as a result of their confidence in the quality of the local products.

Almost at the same time (1970), the efforts of the company's designing sections started to become evident and a contract was concluded for the production of a mine detector which was designed by these sections.

With the company's escalated efforts in the sphere of special electronic equipment, it was deemed necessary to bolster the industrial components compatible with this sphere with its diverse products and relatively small volume. To complete these components, two new workshops were constructed: One for the manufacturing high-precision metal frames and the second for the production of super-quality printed circuits which give the local designer the flexibility to produce unpatterned and various equipment with the precision required for the special electronic products.

The company's first production line was thus set to produce transmission and receiving equipment manufactured on foreign license. The company will bolster this direction after completing the local industrial components by way of:

1. Increasing local participation by producing most of the unpatented [al-shayr namatiyah] parts for the products manufactured on a foreign license, in addition to assembly and testing work.

2. Initiating the stage of imitation [sic], along with the development required for the planning and industrial engineering outfits, the training required for the designing cadres and the improvement required in the company's economics. Only the patented components will be imported, without any payment for the imported design and technology.

3. Local designs for the transmission and receiving equipment expected to be developed by local capabilities either through imitation or through providing the opportunity for training on design and development work in foreign companies.

The company's designing sections have selected the first production sample for an electronic central (with a capacity for 100 subscribers). This central has been tested successfully. Its design has been fully developed locally by the company's designing sections. A contract has been concluded for the production of this central. This product represents the company's second production line for the foreseeable demand volume. Since 1970 and until the present, the designing sections have presented numerous designs for military use. Contracts for the designs were concluded and they have been produced. The company's experience has actually developed through local designing efforts to the degree that it can be said that the structure of the company's special electronic equipment has improved considerably.

Electronic vision equipment will represent the third production line. The company is about to conclude contracts to proceed in this sphere on a foreign license.

The efforts in these lines are focused on either horizontal expansion by completing the production processes and systems or on veritcal expansion by bolstering the [company's] presence and by making local engineering additions with the company's ever-growing experience in the spheres of technological research on operation processes and methods and of designing and developing new products. With the increasing demand for these types of special equipment, the company may decide in the future to terminate its production of home electronic equipment.

With this strategy, it is obvious that dependence on local engineering thinking is escalating. Therefore, it is necessary to draw up clear policies, supported by the state, in the spheres of training and research. To achieve these goals, the company must be supported with reinforced training plans and with budgets that bolster research, development and the policies of incentives for the workers employed in this sphere.

Al-Nasr Television Company:

The company has passed through several phases in its industrial activity. Following are the phases of its development:

1. On the revolution's eighth anniversary in July 1960, which was also the date of the start of television transmission, the company imported 125,521 fully manufactured television sets of various dimensions and models and marketed them, providing the maintenance work.

2. In 1962, the company adjusted its program and started local production by importing some dissembled components and assembling them locally.

3. In 1965, the company embarked on the phase of local industrialization. It concluded a contract with an American firm to import raw materials. Industrialization developed to the point where it reached 70 percent of the various parts of the television set, except for the basic electronic components.

4. In the wake of the 1967 war, the company's production was affected severely and the company turned to the eastern bloc countries. As a result, the quality of its production dropped. Moreover, the rate of [local] industrialization also dropped. This situation continued until 1975 when the company resumed its transactions with the western sector.

5. The planned production rates amounted to nearly 50,000 sets annually, even though this figure can be doubled. The reason [for not doubling it] is the difficulty to marketing due to the relatively high prices and to the availability of television sets imported from abroad by the private sector or by people returning from official missions abroad (the number of sets imported in this manner ranges from 20,000 to 30,000 sets annually).

6. The company's total production in white and black television sets from the time of its foundation until 1977 amounted to nearly 600,000 sets.

7. The company has produced numerous types of multi-purpose electronic equipment for both military and civilian use, such as transmission and receiving equipment (for the armed forces), carrier wave-carrier equipment, electronic computers, loudspeakers, [power] tension regulators, sirens and other types of equipment.

The following chart sheds light on a part of the company's effort in the sphere of civilian and military production:

Year	Value of Military Production	Value of Civilian Production
1969	36	3,437
1970	204	4,205
1971	840 from 1 July 1970 to 30 June 1971	3,130
1972	1,098 from 1 July 1971 to 31 December 1972	5,495
1973	710	2,680
1974	961	4,093
1975	1,380	3,969
1976	1,064	4,996

[No specifications or units given insofar as figures are concerned.]

8. The production of colored sets started in 1977. As a first stage, semi-assembled components were imported and assembled locally and tests were made on them. The total production is estimated at 7,000 television sets.

9. The company possesses both human and technical capabilities that can be exploited (by setting up 13 plants for different types of products) in the interest of electronic production for local consumption or for exportation.

The Arab Transistor Radio and Electronic Equipment Company:

The Arab Transistor Radio and Electronic Equipment Company was founded at the end of 1966 through the merger of three plants:

1. The plant of the Arab Transistor Radio and Electronic Equipment (Telemisr) Company in Ismailia for assembling radio and television sets.

2. The plant of Egypt's Electro-Engineering (MICO) Company which used to belong to al-Nasr Electrical and Electronic Equipment Company (Philips) and which used to assemble radio sets.

3. Al-Haram Plant which used to belong to the Egyptian Transistor and Electricity Company that used to assemble radio sets and to produce chokes and (knuckle pipes).

4. The administration of the projects controlled by the Egyptian Transistor and Electricity Company.

In 1968, all these plants were moved to the company's present site and production started with a value of 1.5 million pounds.

In 1974, the projects administration was separated from the rest and the Industrial Installations and Service Company was set up. The workers of the Ismailia plants returned their previous plant where the production of television sets started.

The company introduced expansions represented in establishing a line for [the production of knuckle] pipes and a plant for the production of home electrical appliances.

In 1977, the value of the company's production amounted to 9 million Egyptian pounds and included 115,000 radio sets and 65,000 television sets. The number of the company's workers amounted to 1,500 workers distributed between Cairo and Alexandria.

The company also added new activities, including [the production] of radio cassettes, car cassettes and loudspeakers and has concluded contracts for the production of colored televisions and stereo equipment.

Most of the company's activities have been characterized by assembly alone because of the difficulty which locally manufactured production faces in competing with the imported production and also because of the difficulty of acquiring the raw materials necessary for this production.

To develop the production and to gain international experience, there is a plan to set up a joint project with the Japanese N.E.C. Company for the production and manufacturing of black and white and colored television, in addition to other electronic equipment, at the company's plants in Ismailia.

Philips Company:

The international Philips Company owns 50 percent of this firm and the Egyptian government owns the rest.

The company has produced 24-inch television sets from components imported from the Dutch Philips Company.

The company's production capacity amounts to 60,000 sets annually, of which only 5,350 sets can be marketed locally.

The company also produces electric bulbs.

The electronic production needed for the plans to develop the radio and television [services] until the year 2000:

Man's use of electronic equipment in his daily life have become a characteristic of the age in which we live. This use is increasing constantly because of their connection with civilizational progress.

The consumer electronics are the industry connected with the electronic equipment which man uses for informational or recreational purposes fundamentally. This equipment includes various kinds that can be divided into the following:

A. Sets to receive radio and television transmission.

B. Recording and replay equipment and storage [al-hifz] equipment.

C. Electronic musical instruments.

At these, computers are included with the consumer electronics industries. However, we believe that listing computers within the electronic computer industry is more realistic and more useful for the purpose of analysis.

1. General Plans Expected to Be Implemented:

The main plan of the Radio and Television Union until the year 2000 can be summed up as follows:

A. Spreading radio transmission over medium waves throughout all parts of the Arab Republic of Egypt (nearly 5 programs).

B. Spreading radio transmission through frequency modulation [al-ta'dil al-taraddudi] to carry musical programs to all parts of the republic. This will be done by setting aside two channels in every television location [sic].

C. Spreading white and black and colored television transmission throughout the republic (more than two channels).

There are definite plans to increase the activity in the field of producing audio-visual programs in both the public sector and private sector studios.

2. Analysis of Preceding Plans:

With the purpose of determining the future of the consumer electronics industries and on the basis of these plans, the types of sets and equipment needed can be defined as follows:

A. Radio receivers:

Medium and short wave receivers.

Frequency modulation [FM] receivers.

Stereo FM receivers (two channels).

Car receivers.

B. Television Sets:

White and black television sets.

Colored television sets.

C. Recording and Replay Equipment:

Equipment to record and replay magnetic tapes (one channel).

Equipment to record and replay magnetic tapes (two channels).

Record players--one channel.

Record players--two channels.

D. Recording and Replay Means:

Era ed and recorded tapes.

Recorded record discs.

E. Musical Instruments:

Evaluating the local market's quantitative demand for each one of these types of instruments requires studying three basic factors:

A. The increase in the number of sets in proportion to the population number as a result of the rising individual income and of the rate of education.

B. Increase in the number of sets because of the population growth.

C. Making up for the consumed pieces of equipment continuously.

Four levels of the spread of this kind of equipment can be discerned:

A. The spread of the basic information apparatus, i.e., the small-size radio.

B. The spread of the white and black television set. Even though this apparatus is basic insofar as information is concerned, its spread is determined by its price. The state must exert efforts to lower its price with its ever-wider use.

C. The spread of equipment with special quality, such as colored television sets, FM sets and the single-channel recording and replay equipment.

D. The spread of equipment with very special quality, such as stereo equipment, car radios and electronic instruments.

3. According to the preceding analysis based on the level of use, the quantities needed of each kind of equipment can be determined as follows:

A. Equipment with level A spread (small radio sets):

The current statistics indicate that there is one radio set for every 8 persons. It is expected that this ratio will amount to one set for every 3 persons in the year 2000. If we take into consideration that the average durability of a radio set is 8 years, as well as the population growth, the volume of the production required presently is 800,000 sets annually which will rise to 2 million sets annually in the year 2000. If the average price per set is 8 pounds, the value of the required number of such sets for the local market amounts to 6 million pounds annually at present and will amount to 16 million pounds annually in the year 2000.

B. Equipment with second-level spread (white and black television sets):

The current statistics indicate that there is one white and black television set for every (20) persons. This ratio is expected to rise in the year 2000 to one set for every 5 persons. If the average use of a set is 12 years, and in view of the population growth, the volume required amounts to nearly 200,000 sets in 1978 and will rise to 800,000 sets in the year 2000. If the average price per set is 100 pounds, then the value of the current production amounts to 40 million pounds and will amount to 80 million pounds in the year 2000.

C. Third-level spread equipment (recorders, colored television sets, and FM equipment):

Recording equipment: The number of recorders can be calculated on the basis of a rising percentage of the number of radios and also by computing on the basis of the preceding percentages of eight percent for 1978 and nearly 25 percent in the year 2000. Considering that the average price per recorder is 30 pounds, the required number of recorders in 1978 amounted to 64,000 sets with a value of nearly 2 million pounds. The value of the number needed in the year 2000 will amount to 15 million pounds.

Colored television sets: The number of colored television sets can be calculated on the basis of a rising percentage of the number of white and black television sets, beginning with about eight percent in 1978 and reaching nearly 25 percent in the year 2000. Thus, the number of [colored] sets in 1978 will be 30,000 sets valued at nearly 9 million pounds. In the year 2000, the value of the colored sets is expected to reach nearly 60 million pounds.

FM sets: The use of these sets will begin at a large scale in 1980. The approximate value of this equipment in 1978 is small. In the year 2000, it is estimated that this value will amount to 10 million pounds.

D. Spread of equipment with very special quality: The use of this equipment will continue to be limited at the outset and there will be no big demand for the equipment in the local market. The total value of the required volume of this equipment can be calculated at nearly 10 percent the value of the equipment with special quality, i.e., a value of nearly 2 million pounds in 1978 and nearly 8 million pounds in the year 2000.

E. Recording and replay means: The needed volume of this equipment can be calculated on the basis of 15 tapes for every piece of equipment, thus bringing the total number of tapes needed in 1978 to one million tapes valued at nearly one million pounds and to 7.5 million tapes in the year 2000 valued at nearly 8 million pounds.

The value of these tapes is almost doubled if the value of the recorded material is added. Moreover, the possibilities of marketing abroad are increasing by such a degree that makes the value of the volume required threefold the estimated value.

As for recorded discs, the demand for them will drop as a result of the use of tapes at a large scale. However, the production of recorded discs is expected to double by the year 2000.

Estimated Total Volume of Consumer Electronics Industries: Estimate of Value of Required Volumes of These Industries:

	Required in 1978 (in 1,000 pounds)	Required in Year 2000 (in 1,000 pounds)
Radio Sets	6,000	16,000
Black and White Television Sets	20,000	80,000
Colored Television Sets	9,000	60,000
Recording Equipment	2,000	15,000
FM Equipment	--	10,000
Recording and Replay Means	2,000	16,000
Very Special Equipment	2,000	8,000
Grand Total	41,000	205,000

Estimate of Rate of Spread of Television Sets and Future Needs Until Year 2000:

The estimates of the Ministry of Planning of the volume of television sets produced and expected to be produced by 1980 are as follows:

Production volume in	1960-65 period:	182,513
	1965-70 period:	244,195
	1970-75 period:	266,312
	1975-80 period:	661,966
Grand Total		1,354,986 sets

If we add to this locally produced volume the number of sets imported at the start of the television service in 1960 and what has been imported through various means since then, it can be said that the number of television sets [in use] ranges between 1.5 million and 2 million sets.

This volume equates with the proper level of education by nearly:

One hundred percent of those with high education, plus 75 percent of those with middle level education [perhaps 100 percent of those with high education have television sets and 75 percent of those with middle-level education have television sets].

If the future needs for these sets are calculated, it becomes evident that they will rise from 160,000 sets in 1977 to 286,000 sets in 1986.

The total number of television sets needed to be produced in the period from 1978 to 1986 amounts to 1.7 million sets.

Production 1974-75-76

Name of Company	17-Inch [TV]	More than 17-inch [TV]	Number	Added Value	Future Projects	Observations of Advisory Office
Al-Nasr for Electronic and Electrical Equipment (Philips)		15,146 (1,517) 17,944 (2,061) 5,353 (693)	461	Actual 1,290,000 Fall production 3,850,000, Total production 2,560 annually		Company capable of producing 60,000. Produces 24-inch television sets from Philips. Production cost lower than others. Production standard is good, promising progress.
Arab Company	7,628 (732) 8,388 (799) 7,685 (710)	6,651 (526) 9,098 (819) 5,772 (544)	300	Actual 1,230,000 42 percent Fall production 3,400,000 Losses 2,170,000	There is agreement with ... to produce 42,000 black and white sets. Canal authority and Kuwaiti investor participate by (1,150,000) [pounds] of company's equipment capital of 3 million [pounds]).	Company's production capacity is 75,000. Highest production cost. Difficulty in acquiring parts. New project will lead to acquiring hard currency and advisors stress importance of this project
Al—Nasr Company	30,111. (2,612) 83,245 (3,183) 26,169 (2,314)	9,950 (1,002) 5,421 (604) 3,231 (288)	680	Actual 1,750,000 43 percent of full production of 5,000,000 Losses 3,250,000	There is an agreement with.... technical aid. Company will get technical aid to produce parts that will raise manufacturing to 65 percent of value of set, including screen and special electronic parts.	Company capable of producing 200,000. Consultants criticize production standard and lack of quality control. Company needs management with high capability and efficiency.
Banha		8,153 (899) 5,867 (890)	300	469,000 62 percent Full production is 866,000 Losses 397,000		Slow production. Low quality standard. Company's specialization in local production does not provide sufficient production opportunities.

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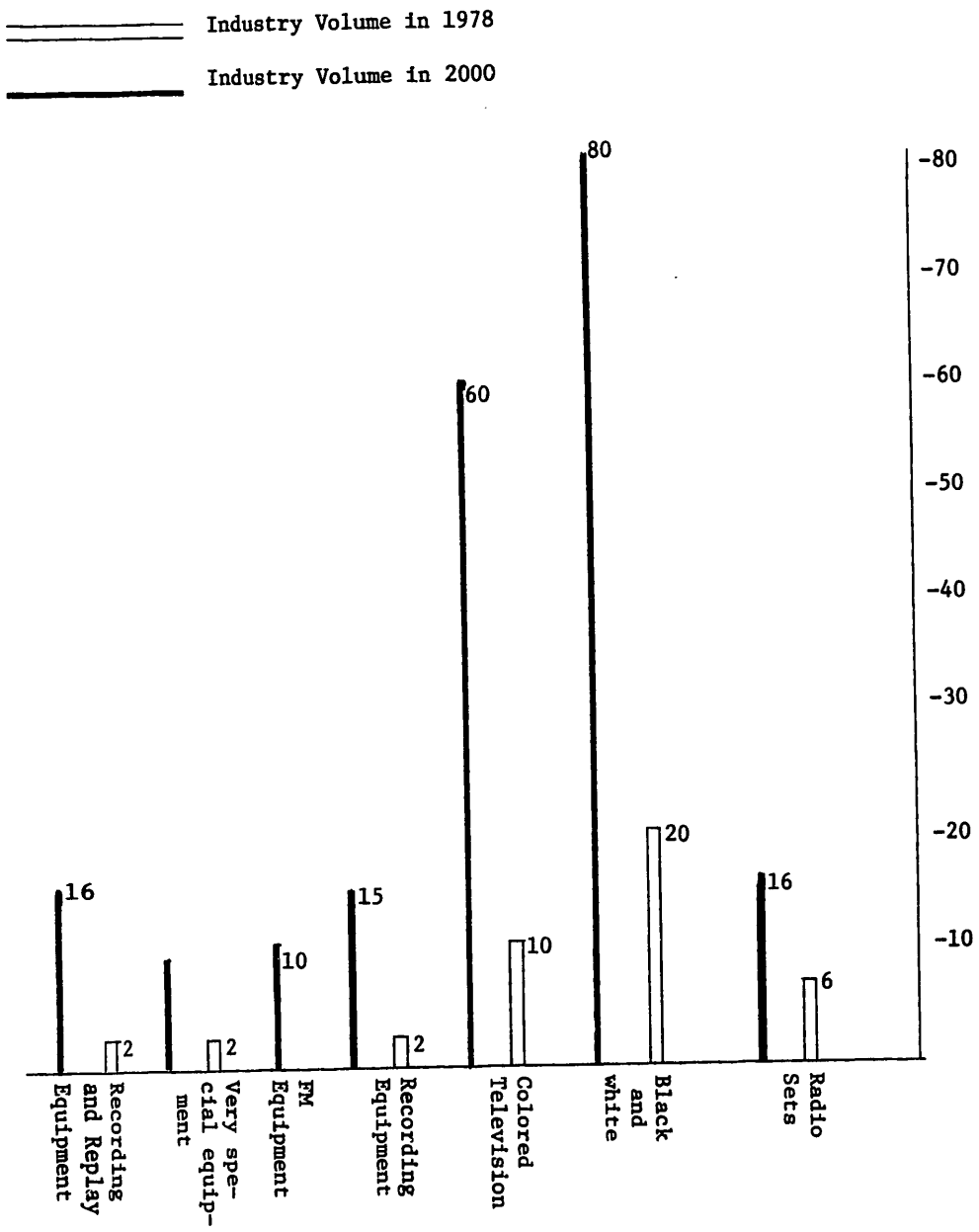
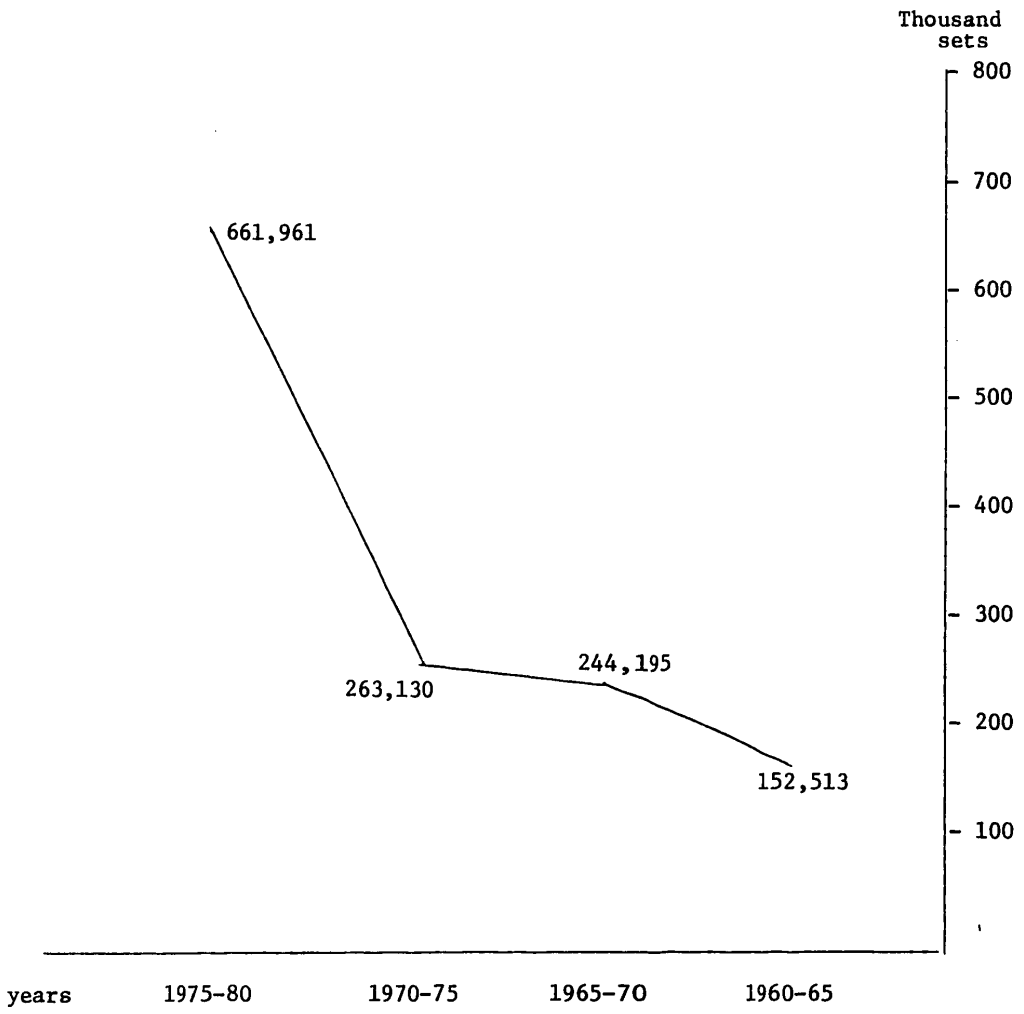


Total Estimated Volume of Consumer Electronics Industry in 1978, the year 2000



Estimates of Ministry of Planning of Number Television Sets Already Produced and Expected To Be Produced by 1980

Estimate of Arab Republic of Egypt's Needs of Television Sets

Estimate based on level of cultural awareness, depending on level of education. By calculating on the basis of 100 percent spread [of TV set ownership] among highly educated citizens and 70 percent among citizen with middle-level education, it has been found that the needs are very close to estimates of the advisory bureau that has conducted a detailed study on engineering industries in Egypt according to attached report.

Year	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
Hundred Percent of University graduates	43	45	46	48	57	59	63	67	70	74
Seventy Percent of Citizens with Middle-Level Education	124	129	132	138	164	171	182	192	197	212
Total	167	174	178	186	222 [sic]	230	245	259	267	286
Estimate of Advisory Bureau	160	172	184	196	208		-	-	-	

If an annual increase rate of seven percent is taken as a base for the years 1987 to 2000, then the estimated annual needs amount to the following:

Year	1990	1995	2000
	375,000	525,000	736,000

[television sets]

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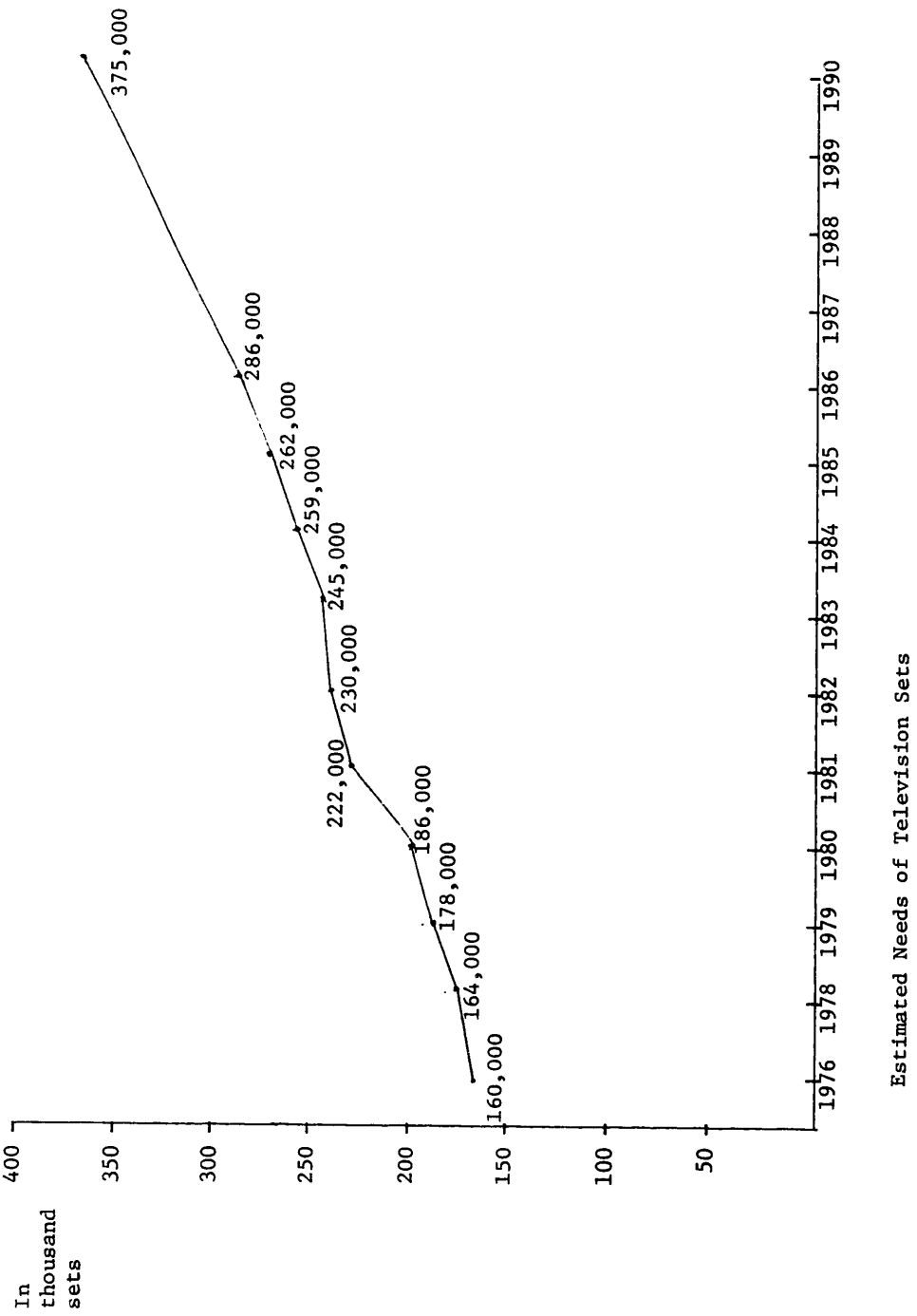

Analysis of Financial Position of Television Production Companies on Basis of 1976 Budget and of Full Production in 1981

	1976 Budget				1981 Estimates			
Name of Company	Philips	Arab	Al-Nasr	Banha	Philips	Arab	Al-Nasr	Banha
Production volume in budget	20,000	22,000	35,000	6,500	60,000	75,000	100,000	12,000
Sale price, Delivery at Company	149.45	109.1	115.6		149.45	109.16	115.6	116.0
Estimated capital	1,450,000	600,000	1,270,000	116	1,600,000	660,000	1,397,000	
Component Nit Costs	1,700,000	1,719,000	2,292,500	284,440	5,100,000	4,777,500	4,550,000	525,220
Labor Wages	175,000	549,000	420,000	110,500	175,000	459,000	420,000	110,500
General Expenses	480,000	67,500	402,500		625,000	87,800	523,300	
Taxes	400,000	405,000	525,000	97,500	1,200,000	1,125,000	1,500,000	180,000
Profits	324,200	295,920	406,000	2,616,000	1,867,000	1,737,000		576,380
Values of Sales	2,989,000	2,947,320	4,046,000	754,000	8,967,000	8,187,000	11,560,000	1,392,000
Profit	7.8%	10%	10%	35%	20%	21.2%	22.2%	41.4%
Added value	1,289,000	1,227,420	1,752,500	469,560	3,867,600	340,950	5,010,000	866,860
Percentage of Added Value	43%	42%	43%	62%	43%	43%	43%	62%

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Analysis of Value and Cost of Labor for Production of a Television Set in Various Companies

	1976 (According to Budget)					Estimated for 1981				
Name of Company	No. of Workers	No. of Sales	Value of Wages	No. of Sales per Worker	Wages per set	No. of Workers	No. of Sales	Value of Wages	No. of Sales per Worker	Wages per Set
Philips	461	20,000	175,000	43.4	8.75	481	60,000	175,000	130	2.92
Arab	630	27,000	459,000	42.9	17.00	630	75,000	459,000	119	7.12
Al-Nasr	650	35,000	420,000	51.5	12.00	680	100,000	420,000	147	4.2
Banha	300	6,500	110,500	21.7	17.00	300	12,000	110,500	40	9.21

1975 Wage Rate Used.

Work Duration: One Shift

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Comparison of 1976 Production Costs Per Television Set in the Four Companies

Cost Element	Philips	Arab			Al-Nasr			Banha
	24 [inch set]	17 [inch set]	20 [inch set]	Medium [size set]	17 [inch set]	20 [inch set]	Medium [size set]	20 [inch set]
Components	85.00	50.00	58.50	52.60	35.00	36.00	35.16	43.76
Valves		10.50	12.00	11.00	15.00	16.00	15.11	
Cabins	90.00				15.00	15.00	15.11	
Wages	24.00				15.00	15.00	15.11	17.00
General Additions		2.50	2.50	2.50	11.50	11.50	11.50	
Production Cost	118.00	80.00	90.00	83.20	88.50	91.80	88.80	60.76
Profit	11.46	12.7	6.10					
Price before Taxes	129.46	92.70	96.10	94.16	83.49	90.10	88.58	
Taxes					15.00	15.00	15.00	
Profit	20.00	15.00	15.00	15.00	11.60	12.00	11.61	
Factory Price	149.40	107.70	111.10	109.16	115.00	119.00	11.40 [sic]	166.00

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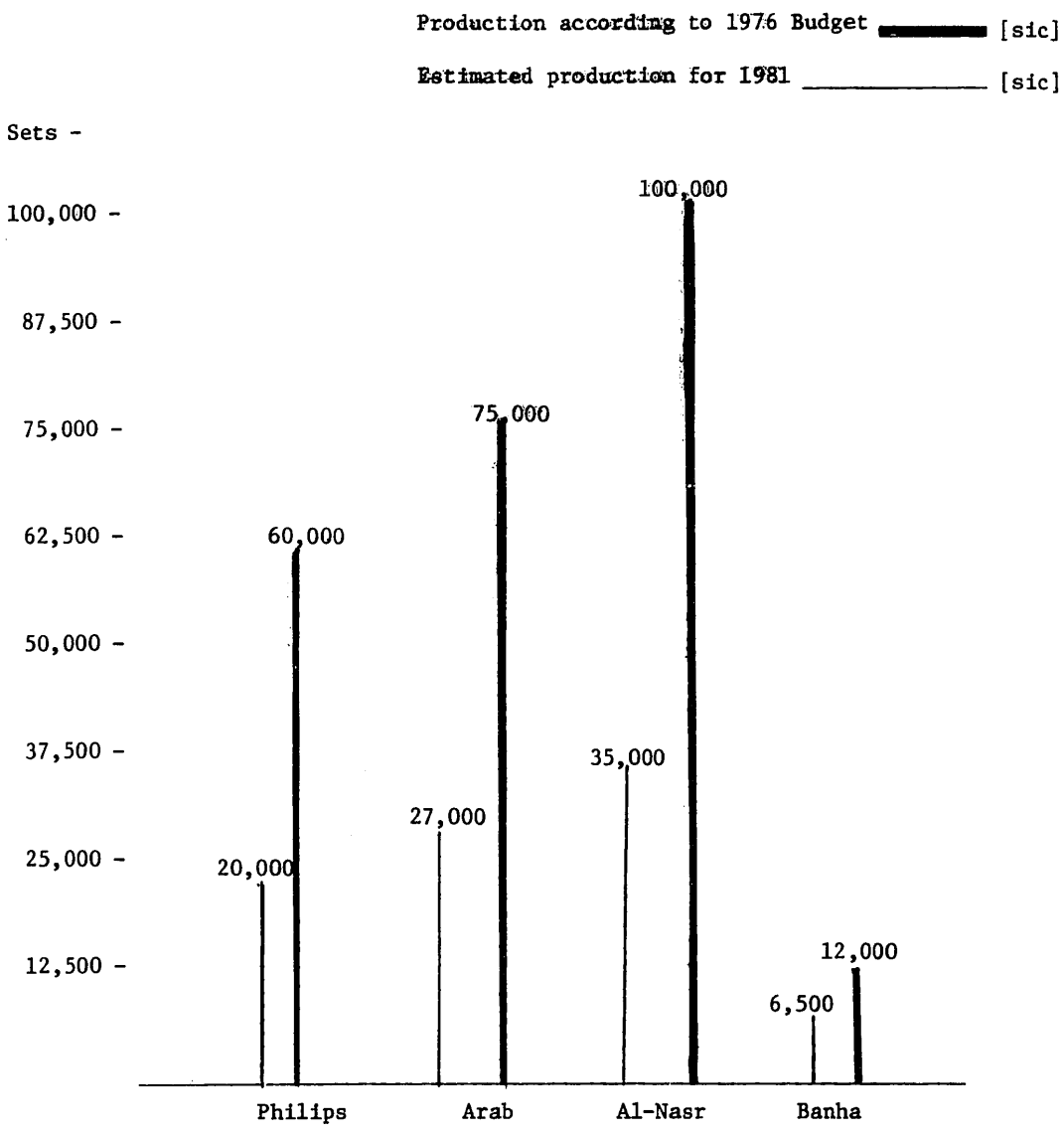


Companies' Production of Television Sets According to 1976 Budget and Estimated Production for 1981

CHAPTER THREE: INDUSTRIAL ELECTRONICS

Manufacturing of Electronic Equipment at Atomic Energy Authority:

Since its creation, the Atomic Energy Authority has devoted special attention to electronics and electronic equipment. It set up the electronic laboratory (the nucleus of the current engineering and scientific equipment section) with the aim of carrying out maintenance and repair work for the nuclear electronic equipment and of starting the production of some electronic equipment by the degree permitted by the human and laboratory capabilities at the time so as to supply the isotope laboratories that were beginning to be established in the various colleges at the time.

Two scalers were designed and assembled in 1956 with the aid of a U.S. expert who was present at the time. The two scalers operated by the B. [binary] system. Valves, neon lamps and an electro-mechanical gauge were used to measure pulsations and an ordinary stopwatch was used to measure time.

Several attempts were also made to produce Geiger pipes with the assistance of the graduates of the Science College. A preliminary apparatus was manufactured to detect radiation but the pipes manufactured at the time were not fully successful and this caused them to be imported until they could be manufactured well locally. The radiation detector was successfully used in the laboratory. But when used in the desert, where the temperature rose at times to 50 degrees celsius, some of its flaws appeared. Most of those flaws were eliminated at the time through the use of a heat-insulating box and through changing some components in the electronic circuit.

Numerous attempts were made to change the electronic circuits in the radiation-detecting apparatus and to improve its qualities while continuing to import Geiger pipes. This went on until the opportunity became available to send an engineer on a scholarship to one of the Italian laboratories for a year's training on the production of Geiger pipes. The engineer then returned with enough data for setting up a plant to produce organic Geiger pipes (filled with argon gas and alcohol). However, the ratios of some of these gases [sic] were not completely known. The plant with its various components--furnaces, equipment for the purification of mercury gases and for the distillation of alcohol--was set up and work then started on experiments to find out the best ratios of the filling gases until these ratios were discovered. The plant then started to produce Geiger pipes.

The experiments to compare the raw materials employed continued and aluminum, brass, copper and copper-plated aluminum were tested until the most suitable raw materials and lowest prices were reached, along with effective operation and diversity in the sizes of the pipes. Large types were manufactured to detect cosmic radiation, at the request of a number of universities, to be used in research. End window models were also produced. With mastering the production of these types, the radiation-detecting apparatus was fully produced locally. This is in addition to the laboratory monitor equipment. Electronic valves were used in the production of this equipment and in the scalers also.

Because the radiation-detector is a portable piece of equipment that needs two batteries, one for low tension and one for high tension, semi-conductives were used in 1964 to produce this type of equipment and one small battery was installed to operate it. As a result of this modification, it was necessary to use a low-pressure Geiger pipe (because the organic pipe required a high tension of 1,200 volts). The alternative was to use halogen pipes which require a tension of only 400 volts to function.

The people in charge of the Geiger pipes plant made many attempts to produce the pipes but the expertise was not sufficient. The aid of the International Atomic Energy Agency was requested and the agency supplied us, by way of India, with a plant for the production of halogen pipes. The plant was set up in 1975 and is still operating efficiently.

As for the scalers using the binary system, they were modified and metric gauging valves were used in them. The stopwatch was replaced by an electronic timer using the metric valves. Several types of this apparatus have been produced to fit various uses.

Other kinds of equipment were successively introduced into the production plan according to the needs of the other sections of the [Nuclear Energy] authority and the needs of the colleges, institutes and other parties. This has brought the total number of the kinds of equipment produced by the engineering section to more than 10 varieties.

The method followed was to start with a patented circuit for the piece of equipment to be produced, then study this circuit and modify it to make it suitable for the required purpose. A prototype would then be built and the necessary tests made on it. Some of the parts of the circuit would then be modified, if necessary, until the piece of equipment could perform the task for which it was constructed. This piece of equipment would be then sent to the production unit where a technician would break the circuit into subassemblies and would prepare the layout for the components of each subassembly. At the same time, the transformer unit would design and roll up the coils needed for the apparatus. On the basis of these two processes, the main chassis would be designed and the location of the valves, transformers and other parts of the circuit would be decided and the chassis

would be constructed in the tinsmithing workshop. The circuit sub-assemblies would be divided among the technicians and each of them would build the required number of the piece entrusted to him, depending on the number of the pieces of equipment needed. When the units were manufactured, the equipment would be assembled on the main chassis, the final connections would be made and then the sets would be tested.

This is the procedure followed if the apparatus required is of the type that is in widespread use. But at times special equipment for research or for specific use is required. The circuit for such equipment is designed by the research unit of the [designing] section and a proto-type apparatus is built. Tests and experiments are conducted on the proto-type until it is made certain that it serves its purpose. The proto-type apparatus is then sent to the production unit so that this unit may produce the required number or the proto-type itself is used if what is required is only one apparatus.

The chassis and cabins for the equipment used to be made of aluminum and then sprayed with (Deco). It was decided to save in the use of aluminum which came to be used for chassis only. Iron sheets came to be used for constructing the external cabins. To gain more experience in metal redlining [al-tashtib] a technician was sent to al-Nasr Television Company for a month's training on metal redlining, such as plating with chromium and other materials.

The credit goes to the constant training given to the engineers and the technicians in mastering the manufacturing of equipment. This training is divided into two parts:

1. Training acquired through sending missions of engineers and technicians for training abroad.

2. Local training given to technicians through theoretical and practical studies on the circuits used in nuclear electronic equipment and through familiarizing these technicians with the various kinds of semi-conductives, their use and the precautions taken when these semi-conductives are used. These studies are given by the training branch of the production unit.

Most of the technicians employed in the production unit are graduates of vocational schools who spent their training period during their studies in the various production plants of the engineering section.

A number of the veteran technicians have gained special experience in some production operations, such as the layout process for the components, sub-assembling the circuit and designing chassis in which to install the components in the smallest space possible, while avoiding overlapping in the various stages.

A number of engineers were sent on training scholarships to India, Italy and Czechoslovakia and a number of technicians were sent to Italy and Liverpool.

A plant for manufacturing printed circuits has been set up in the production unit. Even though this plant is small at present, it will still meet the purpose until another full-equipped unit is built.

Electronic Industry Pertaining to Communication Equipment

In view of the large size of the communication equipment in the modern age, the industry connected with this equipment is considered among the most important industries that can constitute the mainstay of the electronic industries in Egypt.

Numerous countries, including Italy and Japan, have adopted this idea. As for Israel, it has given top priority to this industry and its recreational consumer industries did not begin until this industry had been established and stabilized.

The level which this industry can attain in Egypt and the expected growth in the use of communication equipment in Egypt by the year 2000 can be demonstrated on the following basis:

Communication Networks in Egypt Until the Year 2000

The world's communication networks are becoming rapidly diverse. In addition to the telephone and the telegraph equipment, there are the gradually increasing (digital-type teleprinters) that are getting to be used at a large scale. Moreover, the current communication means also include micronic waves and axis cables.

Cable and Automatic Telegraph Communication:

It is possible to calculate the rate of increase in the number of cables and of the automatic cable lines by using a relationship of the aforementioned kind [sic]. It can be predicted that the increase in the number of telegraph cables will be much less than the increase in the number of telephone lines because the expected improvement in the telephone service will reduce the demand for the use of the telegraph. It is expected that the increase rate in telegraphs in the next 20 years will amount to 50 percent only.

As for automatic cabling [teleprinters], the expected increase will be very high and close to the rate of telephone increase. It can be said that the automatic cabling equipment [teleprinters] will increase at the same rate as that of telephone equipment and will amount to 4,000 automatic cables (200,000 minutes daily) in 1990.

Information-Transmitting Equipment:

It is expected that the demand for information-transmitting networks will rise at the same rate of increase in telephones, and perhaps even faster. Many authorities throughout the republic are about to conclude contracts

for the purchase of information-transmitting equipment, such as the Bank of Egypt and the Ministry of the Interior. There are also experimental attempts to link the computers with one another and to have them used jointly by several sides, such as hospitals, banks and companies.

Private Networks:

Some ministries and authorities in Egypt have their own information-transmitting networks, namely:

The Presidential Office.

The armed forces.

The Ministry of Foreign Affairs.

The Ministry of Tourism.

The Civil Aviation Authority.

The Ministry of Irrigation.

The Meteorology Authority.

The Ministry of Industry, Petroleum and Mineral Resources.

The Radio and Television Union Authority.

The oil companies.

The railroads.

The Ministry of Electricity.

These networks consist of terminals and communication equipment and their planning is different in each case. Because calculating the growth rate of these special networks is very complicated, this rate can be calculated in the general plan on the basis of nearly 25 percent of the transmission capacity of the telephone communication networks.

In addition to these, there is a number of private communication networks that require radio equipment operating on very short and extremely short waves and that can be used to perform very quick services, such as calling doctors in hospitals and linking a number of taxicabs with a management room. There are currently no statistics on this kind of services but they are expected to expand constantly.

Analysis of Data on Local Communication Networks With Aim of Linking Them To Future of Electronic Industries in Egypt:

On the basis of the previous data, this information can be analyzed with the aim of linking it to the future of the industries in the following manner:

The total costs of installing the telephone networks in the period until the year 2000 can be calculated on the basis of an average cost of 2,000 dollars per line. Thus, the total costs until the year 2000 can be calculated at nearly 10 billion dollars. If we assume that the cost of the sets and of the equipment is one half this sum, then this cost will amount to 5 billion dollars. This figure can be considered a definite justification for setting up a special industry which will have an average annual production valued at 250 million dollars, not to mention the addition of other kinds of communication networks and the production of a surplus for exportation. The equipment pertaining to this industry can be divided into the following:

1. Local Network Equipment:

This includes telephone equipment and the subscriber cables and represents approxmately 15 percent of the total costs. Both industries are already present but it is necessary to develop them to meet the actual demands.

2. Communication Equipment:

It consists fundamentally of multiplex equipment and communication means, such as axis cables and directional wave equipment. This equipment represents nearly 30 percent of the total costs, 10 percent of which is for the multiplex equipment and the rest for the communication means. There are currently no industries in this sphere and this is why it is necessary to start establishing them.

3. Switching Equipment:

It represents nearly 45 percent of the total costs. There is already a plant in the Egyptian Company for Manufacturing Telephone Equipment to produce switching equipment. But this plant is not producing the type needed for the future and it is necessary, therefore, to develop the production and to raise its volume so as to make it possible to meet the demand. The said company is sufficiently prepared for this purpose.

Telegraph Networks:

The costs of the telegraph networks consist fundamentally of the costs of the terminals for automatic telegraphing [teleprinters], which will amount to nearly 5,000 telegraphing sets by the year 2000, i.e. with an average annual increase of 200 telegraphing sets annually.

This industry can be added to the telephone equipment industry as an assembling industry. The production capacity in the communication equipment and local networks industry must be increased to meet the demand for these networks.

Information [al-mu-tayat] Networks:

These are represented in the telegraphing networks and the major cost is embodied in the terminals (besides the computers which will be presented as an independent industry in the following sections). Considering that television screens can be used abundantly in the terminals, thought must be given to modifying the screen production plant to meet the demand, in addition to its production of television screens.

Private Networks:

A plant with limited and flexible production can meet the need for these networks. The kind of production in such a plant can be changed according to the designs of the required networks and the plant can be attached to one of the companies, such as Banha Electronic Industries Company.

Spread of Electronic Computers in Egypt:

Electronic computers are used in the Arab Republic of Egypt for special purposes, mostly scientific. However, the use of computers has not spread at a general level.

This use started with the establishment of the main electronic brain centers in one major authority, namely the Central Mobilization Agency. The use then extended to centers belonging to the universities, to meterological work and to collection activities by a number of the public service authorities.

This use has not extended to private commercial business or to public services in banks, hotels, or education. Obstacles continue to face such use, the most important being the lack of electronic computers that store data and produce it in Arabic in a natural and readable manner.

Numerous attempts have been made to modify electronic brains to use Arabic. The backbone of most of these attempts has been the efforts to mostly Arabic script to fit the equipment manufactured fundamentally to deal with foreign languages. It is well known that Arabic requires that each of its characters have three or four different forms that change with the character's position in the word. Arabic, and some other ancient languages, possess the exclusive characteristic of having letter forms that amount to nearly 150 in number.

The attempts of Arab researchers in foreign universities have come up with technological innovations that make it possible to produce the Arabic

letters in their mechanical state, i.e. the number of keys on a typewriter or during storage in electronic computers, for example, remains 28--without letter variations--and the characters take the form of electrical signals when transmitted by cable or by wireless. But when received on paper, an innovation similar to man's memory selects the proper form of the letter for printing, regardless of how many are the various forms of the letters.

This research has ended with types of electronic computers and of telex machines that use Arabic in all phases and that produce printed cards and other forms of documents produced by electronic computers with correct Arabic script.

Arab Telex Networks:

This innovation will lead to correcting numerous conditions arising from the attempts to subjugate the Arabic script to the technology of the western printing machines. This appears clearly in the telex networks. It is surprising that the telex networks between the Arab countries use English or French and that there isn't an Arab network.

The service of communication by telex is one of the modern modes of communication which is spreading and expanding. It is replacing all the other forms of communication, be they telephone or telegraph communications. In some cases, it is even replacing the mail service.

The innovative system that relies on the memory-like modification that distinguished the position of the Arabic letter in a word and that leads to selecting the proper letter form at the communication terminal restricts the number of Arabic letters transmitted by cable or by wireless to 28 letters only. Thus, the wireless cipher is no longer incapable of absorbing all the Arabic letters, considering that selection of the right form of the letter takes place at the final reception terminal and by a memory that controls what form of letter is to be printed.

Importance of Setting Up Electronic Industry for Arabic-[Language] Computers and Telex Machines:

It is necessary that the Arab countries, led by Egypt, move faster to adopt the concept of the contemporary civilization in a proper Arab form. It is also necessary that various forms of the electronic computer industry be set up speedily and with the capacity and volume compatible with the various purposes. It is necessary that this industry be an Arabic-language industry and that it reject the foreign attempts that seek ceaselessly to efface the facts of the Arabic language, to eliminate this language and to introduce foreign characters in writing it. Arabic is the sublime of all these languages and the one most suitable for digital dealings. It has special measures that make it possible to

derive nouns, verbs and abstract nouns. Arabic is considered one of the most suitable languages for mathematical balances and this makes it a more suitable language for electronic computers and brains. Numerous qualities and merits of the language will become obvious when the use of electronic brains and computers spreads in the various spheres that are ready and prepared to accept the electronic computers as a means for numerous kinds of work that go beyond man's patience and kinds of work that are so complicated that they require long time and references to perform--kinds of work that complicate both the problems of time and place needed to carry out the work with the ease and smoothness required for good performance.

Many problems apparent in dealing with the masses can be solved by the use of electronic computers and brains, provided that they are in correctly written Arabic. This has become possible now that technology has been subjected to the requirements of Arabic scrips.

There is no avoiding the exertion of serious efforts to introduce the electronic computers and brains into the various spheres of work sincerely, provided that this is done according to our needs and in our Arabic language. This sphere alone throws on the shoulders of the future electronc industry the task of setting up numerous plants to produce Arabic computers for various purposes.

Egyptian Company for Production of Telephone Equipment:

The company was founded fundamentally to meet the Telecommunication Organization's needs of public centrals and telephone equipment and as a result of the organization's decision to select the crossbar system, designed by the Swedish Ericson Company, as the republic's adopted telephone centrals system. The contract for production was signed with Ericson Company in 1959.

The company's current production program includes manufacturing the following products on a license from Ericson Company:

Public centrals of the ARF 102 (Crossbar) model--30,000 lines.

Private centrals of the PABK's model--10,000 lines.

Telephone sets of the modern Dialog model--70,000 sets.

The production capacity for public centrals and telephone sets was decided in the light of the Telecommunications Organization's needs, considering that the organization is the company's sole client for public centrals and its main client for telephone sets.

The rate of local industrialization is estimated at the following:

Nearly 65 percent of the total value of equipment in the centrals and approximately 80 percent of the value of the components of the switching [boards.]

An average of nearly 60 percent of the value of the private centrals.

Nearly 84 percent of the value of the telephone sets.

Development of Company's Products:

The company's production of the old models started in 1963. In 1965, the company began production of the Dialog model with its developed design (printed circuit, unbreakable external parts and easy maintenance, considering that the apparatus consists of seven units tied together by one nail) to replace the old model completely by 1979.

Public Centrals:

The production of these centrals began in phases as of 1967. The final phase was completed in 1971. No development has been made on this product due to the inadequacy of the investments allocated for the company, to the drop in demand on the part of the organization and due to the lack of a clear and definite plan for the organization needs in terms of both models and of production volume. The company's total supply to the organization from 1968 to 1976 did not exceed 70,000 lines at a rate of 9,000 lines annually whereas the available production capacity is within the limits of 20,000 lines annually. This has had a major impact on the inability to introduce any developments.

The company did actually begin in 1978 taking the necessary measures to raise the technical standard of the products to equal the standard prevailing in Ericson Company.

Company's Electronic Industry:

The company is, as a modest start, assembling currently the special printed board for telephone equipment.

At the end of 1977, the Telecommunications Organization approved the use of the advanced ARE model of the Crossbar centrals--a model which is electronically controlled. A total of 20,000 lines of this type will be installed in the Ramsis central in 1979. Agreement has also been reached with the organization to introduce this model in the company's production program as of 1979. The company will begin delivering this model gradually as of 1980 so that it may completely replace the current ARE model by 1983. This will be done within the framework of the approved 1978-82 plan which provides for [installing] an average of 40,000 lines annually. The company has begun to prepare the necessary studies with Ericson Company for selecting and assembling the printed circuit units for the ARF and ARE models with the aim of training the workers in this sphere as a first step toward emarking on the electronic industry, even though the aforementioned volume is not considered economical in itself. The equipment used in this sphere can be utilized to repair the printed circuits in the centrals currently in use and those to be constructed in the future.

CHAPTER FOUR: MILITARY ELECTRONIC INDUSTRIES

Goals of Miliary Electronic Industries:

The military electronic industry seeks to produce electronic instruments and systems necessary for the military equipment used by the various branches of the armed forces (the army, the air force, the air defense, the navy and reconnaisance).

The instruments and systems are numerous and cover all spheres and branches of the electronic sciences. The most important such equipment includes:

Radio communication equipment and information-transmitting equipment operating on various wavelengths.

All kinds of radar equipment.

Guidance and control instruments for the various types of missiles (surface-to-surface, surface-to-air, air-to-air).

Aviation equipment for military aircraft.

Electronic jamming and obstruction equipment.

Monitoring and direction-finding equipment.

Night vision equipment.

Electronic [heat-] seeking heads and other kinds of equipment.

These kinds of equipment are divided according to their use. There is ground equipment, equipment fitted into aircraft and missiles and equipment fitted on ships.

Importance of Military Electronic Industry:

The military electronic industry is one of the important strategic industries and states are eager to set up and strengthen this industry because all modern weapons and military equipment use electronic means, systems, instruments

and sets for various purposes. The creation of an advanced military electronic industry in a country secures the equipment demands of the armed forces of such a country and keeps confidential the secrets of the equipment used by its army.

The military electronic industry is a scientific industry primarily and the creation of such an industry leads to the development of a generation of scientists, engineers and technicians with a high technical and technological standard--a generation that forms a reserve for supplying the non-military electronic industries in the same country, thus enabling these industries to advance and prosper.

Moreover, the military electronic industries are considered among the industries that yield a quick and important economic return due to the small cost of the investment needed to establish these industries in comparison with the value of the production and due to the short period of the production cycle. Furthermore, there is an ever-increasing demand by the various countries for military electronic equipment and an astonishing race for the acquisition of the latest equipment or counter equipment for whatever the enemy innovates. This fact secures for the advanced electronic industry an important and special market where the price factor does not form the basic element in purchase.

The attached chart demonstrates the estimated sums spent in 1978 by 10 Mideastern countries for the purchase of military equipment--a sum exceeding 25 billion dollars. Assuming that the value of the electronic equipment constitutes only 20 percent of the value of this equipment, then the value of the electronic equipment [purchased] in 1978 amounts to 5 billion dollars. This makes evident the importance of setting up a military electronic industry. This fact has urged the major powers (United States, Russia, France...) to forge ahead with this industry and to control its international markets both economically and politically.

Israel has also been aware of these facts, in addition to its conviction that setting up this industry constitutes one of the mainstays of its security. The military electronc industry in Israel started in the mid-1960's and concentrated on the production of radars, missile guidance systems, electronic war instruments and communication equipment. Israel has already moved into the stage of exportation.

Iran also started a few years ago establishing a military electronic industry, beginning with an electronic plant near the city of Shiraz as a nucleus for a complete colony of electronic industries. Iran started producing some equipment for ground radars in cooperation with the U.S. Westinghouse Company, guidance instruments for the (Rapier) surface-to-air missile in cooperation with the British Aerospace Company and guidance instruments for the U.S. (TU) missile in cooperation with the U.S. Hughes Company. Iran spends generously on this industry and encourages its citizens who are working abroad to return to Shiraz, giving them comfortable life, attractive salaries and scientific, laboratory and industrial resources to entice their scientific and technical ambition.

Estimates of Spending on Military Equipment by Mideastern in 1978

Number	Country	Spending (In Billion U.S. Dollars)
1	Egypt	4.37
2	Iran	7.9
3	Iraq	1.66
4	Jordan	0.20
5	Kuwait	2.06
6	Libya	0.299
7	Oman	0.457
8	Saudi Arabic	7.530
9	Syria	1.070
10	Emirates	0.100
	Grand Total	25.576

Assuming that electronic equipment represents 20 percent of the total spending, the expected market for the military electronics amounts to 5,115,000,000 dollars.

Israel's defense spending amounts to 4.27 billion dollars. Consequently, its spending on military electronics is estimated at 854 million dollars.

Mainstays of Military Electronic Industry

Personnel:

The electronic industry is a scientific industry primarily and it depends on the ability to design and to develop. It is focused on designing and producing equipment and it is not conditional to embark on manufacturing the components, except when it is impossible to acquire the needed components from the international market. Therefore, this industry relies mainly on the engineer capable of producing designs and innovations. The emergence of the modern methods of production has led to reducing the unskilled labor in the electronic plants. This has consequently led to a sharp rise in the number of engineers in such plants--a number that exceeds 50 percent of the manpower in some of these plants. This is why paying attention to giving the individual the highest standard of education and training and providing the means of constant scientific contact with the advanced countries are considered among the most important mainstays of this industry.

Setting Up Design and Development Laboratories:

It is necessary to set up design and development laboratories attached to the military electronic factories so that they may be capable of developing the product constantly and of maintaining its technical and technological superiority in facing the ceaseless competitions.

Providing Means and Methods of Production:

Military electronic equipment and instruments are subject to international military standards that require precision, high efficiency and a very low rate of damage even though such equipment is subjected to extreme environmental conditions such as vibrations, shocks and varying degrees of temperature and humidity.

These standards require the use of speical air-conditioned workshops that are free of dust. They also require the application of numerous and precise technical control and inspection systems during and after production, as well as conducting performance tests at the same level and with the same rules as those applied in the international military plants.

Supplying Electronic Components:

Setting up a military electronic industry requires by necessity securing quick and very highly efficient means for acquring the electronic components from their original sources as soon as they are needed. This is in addition to supplying scientific studies and publications constantly, regularly and speedily in order to keep up with the latest scientific developments in this industry.

Establishing Direct Cooperation With Armed Forces:

To secure success for this military industry, there has to be firm cooperation between the user (the armed forces) and the producer (the plant) in the various phases, especially:

In the phase of testing the equipment required to be produced.

In the phase of determining the technical specifications that realize the purposes for which the product is to be used.

The phase of final tests and of performance evaluation.

The phase of the actual use of the equipment and of evaluation of the results of the use.

Military Electronic Industry in Egypt:

1. The military electronic industry started in Egypt in the early 1960's and was concentrated in two sites:

A. The Banha Electronic Industry Plant: This plant was set up to produce military equipment and some conventional components, such as transistors, resistors and capacitors.

The plant currently assembles and tests some parts of radio communication equipment.

B. Al-Qahir and al-Zafir Plants: This plant designed and produced locally the guidance, control and range-finding instruments for al-Qahir and al-Zafir (surface-to-surface)missiles.

This was done with the assistance of a team of Germans on personal contracts. The equipment was produced in the laboratory and the flight tests were successful.

With the cancellation of this project, activity in this sphere came to a halt. This experience has proven that the Egyptian engineer is capable of designing, producing and testing modern military electronic equipment.

At the end of 1975, the Arab Industrialization Organization(which includes the Arab Republic of Egypt, the Kingdom of Saudi Arabia, the United Arab Emirates and Qatar) was formed with the aim of setting up an advanced military industry, including the electronic industries.

The organization's efforts in the military electronic industry are confined to the following spheres:

A. The production of missile guidance and control systems.

B. The production of (navigational and combat) radars and the equipment attached to them.

C. Production and development of aviation and communication equipment for the military aircraft produced by the organization.

D. Production of special electronic equipment at the request of the armed forces.

The organization has followed a specific policy to secure the elements for the success of this industry. These elements are embodied in the following:

The organization is supervised by a higher committee comprised of the defense ministers of the four countries. This committee determines the organization's general strategy in light of the demands of the armed forces and approves the industrialization [production] program.

Implementation of the modern methods of project studies, especially the economic and technical feasibility studies in whose light the decision is made on what to produce and on the depth and stages of production.

The technical committees select the latest equipment available in the international market to guarantee the possibility of its use for long periods, to make sure that it does not become obsolete [quickly] and to realize a technological leap in order to catch up with the international bandwagon.

The method of forming joint companies is followed so that the international firms may use a part of their monies with the organization. This realizes

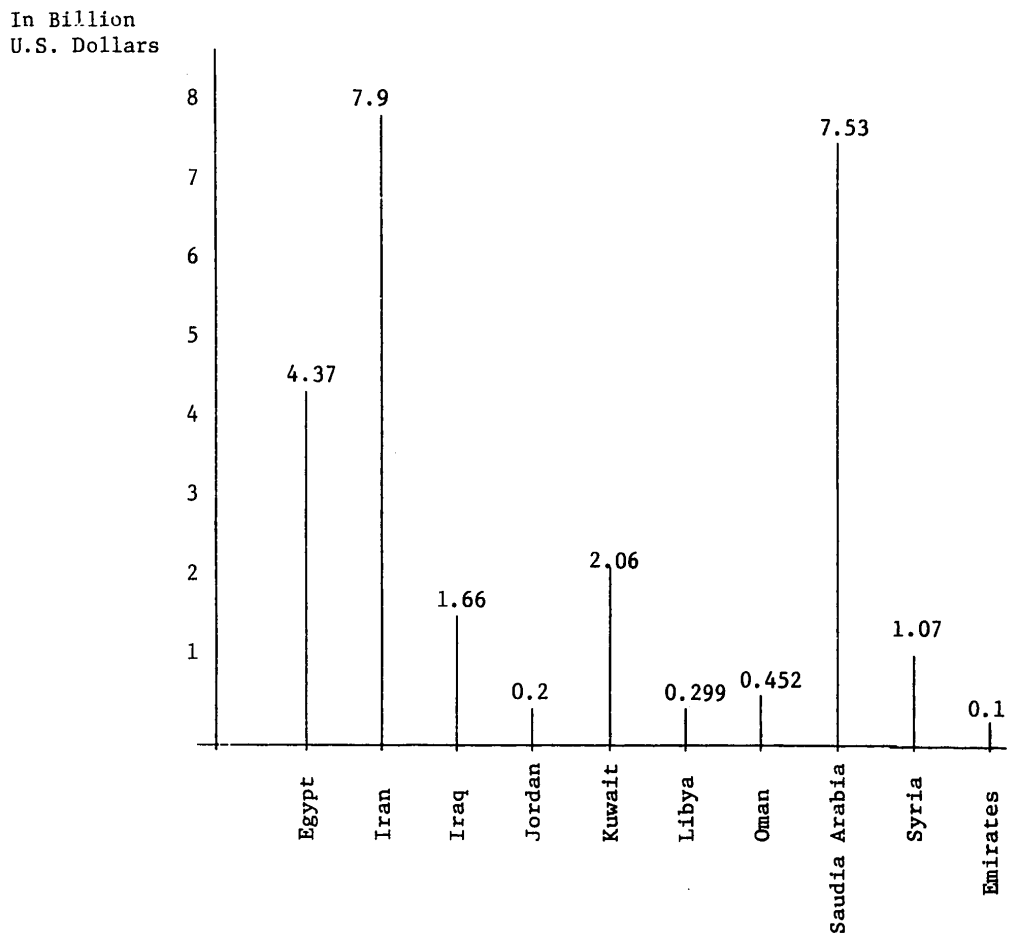
the goal of making sure that these firms are eager for the continuation and success of the projects. Moreover, the participation of the firms in managing the joint plants provides a greater opportunity for the transfer of managerial and technical expertise at the highest level.

The organization devotes attention to providing training at home and abroad in the various branches of the electronic sciences. The organization sends large numbers of engineers and technicians to get training in the international factories, universities and scientific institutes.

Until the research and development cadres capable of working in the sphere of military electronics are formed, the method of acquiring manufacturing licenses and technical aid guaranteeing the right to the transfer of technology to all the cadres and levels is being followed. The organization has also been eager to make sure that the agreements include concentrated programs for practical training in the plants of the firm granting the manufacturing license--training on the methods of producing, testing, performance, designing and quality control of the equipment covered by the agreement.

The organization is eager to include in its agreements provisions for participation by its engineers in the phases of designing and development of the products covered by the agreement as a first step in creating the research and development cadres for its future products.

Estimates of Spending by Mideastern Countries on Military Equipment in 1978



CHAPTER FIVE: TRAINING AND RESEARCH IN ELECTRONIC INDUSTRIES

The establishment of the electronic industries had to be accompanied by the establishment of a research and development center that builds a new generation of researchers, engineers and specialized technicians with high qualifications and with the capability to meet the country's needs without resorting to foreign experts in every case.

The Electronic Industries Research and Development Center carries out the following:

1. Design and develop advanced prototypes for the equipment to which the right of knowledge [sic] is acquired and then proceed to design and develop gradually prototypes with all their technical components for new equipment needed for the local market and for exportation and with a profitable economic return.

2. Conduct research and studies on the use of local raw materials and components in manufacturing electronic equipment.

3. Provide technical services for the industries engaged in the sphere of electronic equipment and instruments.

These were the goals set for the Electronic Industries Research and Development Center of the Ministry of Industry when it was established in 1969.

Synopsis on Electronic Industries Research and Development Center:

The Electronic Industries Advisory Committee recommended in 1969--at the time when preparation of the projects of the third (1970-75) five-year plan for the electrical and electronic industries was started--that an electronic industries research and development center be established to increase the number of scientifically trained citizens.

The Electrical and Electronic Industries Organization started to prepare for the establishment of this center. It purchased a number of scientific measurement instruments fit for general purposes to equip the first two laboratories, namely:

The electronic measurement instruments laboratory.

The very high frequency [VHF] radio equipment laboratory.

The organization also purchased about 1,000 specialized scientific books on electronics and the sciences connected with electronics and subscribed to about 50 different technical magazines. A number of engineers were also apppointed.

In 1969, the organization concluded a scientific and technical cooperation agreement with the GDR which included the center's needs of experts and scholarships to set up the two aforementioned laboratories.

In 1972, a sum of 500,000 dollars was allocated for the first phase and the project document was signed in October 1974 and included the following:

A total of 105,000 dollars for experts.

A total of 50,000 dollars for scholarships.

A total of 325,000 dollars for equipment and other requirements.

A total of 20,000 dollars for miscellaneous expenses.

Grand total: 500,000 dollars.

Two GDR experts were brought to the country in accordance with the scientific and technological cooperation agreement. One of them (Dr Paine) was specialized in electronic measurement instruments and the second (Mr Kadan) was specialized in high-frequency transmitters and receivers. Five scholarships were also sent to the GDR.

In 1973, the foundation of the laboratory for the electronic measurement equipment and the laboratory for the VHF equipment was started.

The two new laboratories were equipped with the (new) instruments previously imported with the knowledge of the Electrical and Electronic Industries Organization and with the (used) equipment purchased from al-Nasr Television Company and from Factory 36.

Components and raw materials imported previously with the knowledge of the Electrical and Electronic Industries Organization or purchased from Banha and al-Nasr television companies were also acquired.

The experts started to train a number of engineers on research and designing, each in his own field.

In 1974, the foundation of a third laboratory for television and radio equipment was started. Equipment and instruments were imported to equip the laboratory and training was given to teams of engineers.

Establishment of the mechanical designing and technology laboratory was also begun under the supervision of a GDR expert in accordance with the bilateral scientific and technological cooperation agreement. The document of the U.N. Development Program concerning the Electronic Industries Research and Development Center was also signed.

Implementation of the project was started in 1975 in cooperation with the United Nations. Equipment and accessories valued at 200,000 dollars and a number of books and magazines valued at 15,000 dollars were requested for the center.

A draft was also prepared for the second phase of the project, covering the 5 years from 1977 to 1981. The United Nations will donate 2.5 million dollars toward this phase and the Egyptian Government will participate with 2 million Egyptian pounds to meet the expansion in the center's activities in the following fields:

Telecommunication equipment.

Electronic measurement instruments.

Consumer electronics.

Electronic components.

The center's fourth five-year plan for the 1976-80 period has also been prepared. The plan's costs amounts to 2 million Egyptian pounds and provide for acquiring land and building a new premises for the center on it.

On the other hand, research and developments have been made in the following spheres:

Carrier receiver and transmitter--PTR 101: The laboratory prototype for the receiver set units and most of the transmitter set units has been completed and a mechanical design for the apparatus has been constructed. The work has faced numerous difficulties because of the young experience of those working in this field which requires long experience for overcoming the difficulties of designing VHF equipment.

The Oscillescope 20 101: The prototype has been developed by using two printed plates instead of five printed plates so as to improve the instrument's performance and reliability.

Digital multi-measurement set--DM 101: The first phase of the initial design was started through use of the components available to the center with the aim of benefitting from the experience gained to make other digital equipment.

Economic television set: Initial designs have been made for the following units:

Channel selector.

Visual signal circuits.

Sonic frequency circuits.

Horizontal deflection circuits.

Vertical deflection circuits.

These designs have been developed through the use of components available to the center and in the local market.

Various (non-frequency) measurement instruments: The following production-assisting instruments have been designed and constructed:

An instrument to measure insulation up to 3,000 volts.

Sweep generator.

An instrument generating a constant current of 20 volts.

An instrument producing a constant current of 100 volts.

An instrument producing a constant current of 15 volts.

In 1976, the center's Higher Technical Committee recommended that greater attention be given to projects for which contacts have already been concluded so that the center's efforts may be divided as follows:

Seventy percent for solving the problems of the industry and of the projects for which contracts have been concluded.

Twenty percent to projects for which no contracts have been concluded.

Ten percent for training.

Contacts have been made with the following companies to deal with the problems shown next to the name of each company:

The Alexandria Shipyard Company: Developing the control unit of the balancing machine so that it may not have to depend on Russian spareparts.

Developing the control units of the cavitation machines, both those operating by valves and by transistors, so that modern components available in the international market may be used.

Instrument amplifier for the (operation) and control equipment.

Developing a local 600-watt radio station.

The Iron and Steel Company:

1. A 50-watt sonic frequency amplifier.

2. Standard control unit.

3. A VHF transmitter-receiver.

4. An instrument amplifier.

The Arab Radio, Transistor and Electronic Equipment Company:

1. Developing the (final blast) testing unit.

2. Designing and constructing a network to supply the radio assembling lines with the required frequencies [sic] so as to control the quality of the radio sets.

3. Developing and designing the electronic circuits for the Polish cassette recorder that the company intends to produce.

In 1976, the center completed the control unit for the balancing machine of the Shipyard Company by using integrated circuits and transistors. Four control units were produced and they are operating well in the company.

The center also conducted studies on and prepared for the other projects. The components and parts not available in the center and in Egypt have been requested from abroad.

In 1976, a training course was given on repairing scientific electrical and electronic equipment. The course was given on behalf of the Arab States Education , Sciences and Culture Organization and was attended by 12 technicians from seven Arab countries and two technicians from the Arab Radio and Transistor Company. The course provided theoretical and practical training for a period of 6 months.

In 1977, the center prepared the final draft [plan] for the second phase of the U.N. project with the aid of the U.N. expert. The most important features of this draft are:

Setting up an electronic industries laboratory to solve the problems of the industrial companies engaged in the field of electronics and to develop the industrial electronic equipment and systems.

Setting up a laboratory for precision computers with the aim of training the center workers on their use and with the aim of developing the systems of use according to local needs.

Setting up a laboratory for quality control, for analyzing damage and for measuring reliability.

Studying the country's future needs of electronic equipment and components.

Designing and developing prototypes for consumer electronics, for communication equipment and for measurement and control instruments.

Setting up a laboratory for thick-plate electronic circuits and developing modern electronic components that use this technology to meet the country's needs, concentrating as much as possible on local raw materials. The United Nations will donate 600,000 dollars in the 1978-82 period. The center also seeks to acquire more aid through bilateral agreements to complete financing the project. Egypt will also participate with 1.5 million Egyptian pounds during the 1978-82 five-year plan.

In 1976 and 1977, the set up modern and advanced laboratories for a limited production of the one-side and two-side printed plates are used in:

Precise computer controlled drawing facilities which are imported from Switzerland and which give precision of up to 62.5 microns (a micron being $\frac{1}{1000}$ of a millimeter).

Photographing and ratioing equipment, including a ratiograph camera capable of taking pictures at a scale of 1:1, 1:2 and 1:4, developing and drying equipment and film storage facilities.

Numerical controlled drilling M. C. equipment from the Swiss Pesalux Company.

Photo-resist direct photographing equipment imported from West Germany.

Etching m/c equipment imported from West Germany.

Zinc, silver and gold plating equipment from West Germany.

Through-Hole-Plating equipment from West Germany.

Silk screen equipment (fabric binding--photographing--picture developing, washing and printing) from Labsco Company in West Germany.

All these units have been installed and are in operation. Experiments are in progress to produce a printed plate for the telephone equipment of the Telephone Equipment Company.

In addition to the above, the following has been achieved:

Supplying the center with an oscillescope.

Setting up a small workshop.

Constructing control circuits for the cavitation machines of the Alexandria Shipyard Company.

Designing and constructing a part of the frequency distribution network for the Arab Radio and Transistor Company.

Repairing the digital control unit of al-Shurabji Company.

Research and Training Centers

Telecommunications Research Center:

A republican decree establishing this center was issued in 1973 and the center has carried out a number of applied studies through forming work teams of people working in communications. The center also introduced the system of conducting research through agreements with the various universities.

A number of well-equipped laboratories have been set up, the most important being:

A. The computers laboratory used for communication purposes.

B. The centrals [telephone exchanges] laboratory.

C. The communications laboratory.

D. The radio communiations laboratory.

E. The networks laboratory.

The center has also formed research teams in the same specialized fields.

The Communications Authority supplies a certain percentage of the center's finances and the rest comes from other resources.

Al-Haram Research Center (Radio and Television Union):

This center, which follows the Radio, Television and Broadcast Engineering Union, was set up in 1964. It represents currently the General Administration of the Broadcast Engineering Research and is divided into two main sections:

A. The General Electronics Central which is in charge of the Electronic Materials Control and the Electronic Equipment Control.

B. The General Communications Control which is in charge of the Precise Frequency Equipment Control, the Antennae Equipment Control and the Communication Equipment Control.

Each control has an averagely equipped laboratory. The center has carried out more than 50 applied studies which have resulted in a long list of products including precise frequency equipment, antennae, electronic materials and studio and broadcasting equipment.

The center has also conducted a number of fundamental studies approved by the International Radio Advisory Authority (the C.C.I.R.). The United Nations has allocated for the center aid amounting to 450,000 dollars as of the beginning of 1979. The center is currently experiencing various administrative and financial difficulties.

Production Experiments Connected With Applied Research:

Engineering Section of the Atomic Energy Authority:

This section has been able to carry out successful studies and research in the field of producing radiation-measuring equipment. These studies have already moved into the sphere of production and a number of radiation-measuring instruments have been produced locally. The section even sells its products to the various organizations. These efforts are considered pioneer efforts in this regard.

Production Experiment in al-Haram Research Center:

The center has sold its production to the armed forces, to the broadcasting station's engineering section, to the universities and to other organizations. This experiment has proven the possibility of relying on production to finance the various applied research activities.

Fundamental Research Centers:

The communication engineering sections of the engineering colleges of the various universities are currently engaged in fundamental research work. These sections are:

1. The communications section of the Cairo University Engineering College.

2. The communications section of the Alexandria University Engineering College.

3. The communications section of the 'Ayn Shams University Engineering College.

4. The electricity section of al-Azhar University Engineering College.

5. The communications section of the Asyut University Engineering College.

6. The communications section of al-Minufiyah University Engineering College.

7. The communications section of Hulwan University Engineering College.

This is in addition to the electrical engineering laboratory of the National Research Center.

Training Centers:

Engineers are graduated currently in Egypt from the communication sections of the various universities. The idea of building the practicing engineer who graduates from specialized institutes has ended [presumably meaning has been put to implementation fully]. Theoretical instruction in all these sections is very good but practical application is very limited. As for technicians, they are supplied by:

A. The technician training centers.

B. The vocational secondary schools.

C. Graduates of the preparatory technical schools.

These institutes and schools do not supply a sufficient number of technicians. This is why the service agencies and some companies set up their own training centers to supply the technicians they need. Some of these centers are:

A. The Communications Training Center of the Communications Authority.

B. The training department of the Broadcasting Engineering [Authority].

C. The training department of al-Nasr Television Company.

D. The training center of Banha Company.

As for the idea of providing constant training to the engineers and the technicians, it is not embodied fundamentally in the aforementioned training centers. However, this kind of training may be acquired in an unplanned manner, such as when the individual completes his own training by reading and by practical observation.

There are also no set criteria to measure the rise in the standard of the worker's [skill] and to reward the more advanced workers.

Status of Fundamental and Applied Research Centers in Field of Electronics-Present Policy of Applied Research Centers:

Proper equipment is available to the applied research centers at present but the skilled manpower is not available in most cases.

The shortage of the right labor arises fundamentally from the presence of an obvious contrast between the wages of the labor working in these centers and the wages that this labor can earn if it works in the Arab countries or in some of the local private sector companies. Some of

the people working in research even abandon their work to enter the field of service or of business. Some of the people who continue to work in the centers do so in order to get their M. A. and their Ph. D. degrees. Then the university, with its special cadre, its status and its role, becomes more attractive and these people abandon their work in the applied research centers.

Moreover, there is no coordination among the centers themselves or between the centers and the production circles. There is also no coordination between these centers and the fundamental research centers.

In the absence of a specific policy for these centers, they are often asked to engage in work that is not within the sphere of research, designing or development and that is mainly connected with maintenance. This is especially the case in the research centers of the service agencies.

Many of the products developed by these centers have been received with the objection that they are imitations of foreign products. The answer to this objection is that the applied research center can meet the demand. Moreover, the said imitation is not easy. The real difficulty of this imitation lies in the production technology. Such a policy [of imitation] has acted as a basic factor in developing the electronic industries of many of the countries that are currently advanced in this field.

Current Policy of Basic Research Centers:

Due to the lack of a connection between the applied research centers and the basic research centers, the former are not constantly made aware of the problems directly connected with the local situation--problems for which fundamental research is desirable.

This is why these research centers preoccupy themselves with studies selected according to the desires of the researchers and without the presence of a comprehensive plan. Such studies are beneficial in preparing the researchers and developing their abilities and in supplying staff members to the universities.

Some of these centers have concluded contracts to carry out applied research. They have also concluded successful contracts to provide instruction on a number of advanced disciplines and curricula.

Many of the centers have large numbers of well-qualified researchers who only lack a sufficient degree of contact with the applied aspects of work. Moreover, many of the centers are experiencing severe deficiencies in laboratory equipment.

As a result of this deficiency, there has been a definite inclination toward theoretical theses that are prepared without any laboratory studies. This confirms the theoretical inclination and the lack of actual practice

in many of these centers. The Scientific Research and Technology Academy is trying, through the Specialized Council for Applied Physics and Electronics, to establish some planning and coordination among these centers.

Determining Role of Applied Research Centers in Electronic Industries:

The applied research centers in the Arab Republic of Egypt have become numerous and their spheres of work have overlapped. As a result, the role that these centers perform to energize the electronic industries have also overlapped. In the absence of the right intellectual clarity, deficiency in planning usually develops.

The applied research centers are divided into:

1. Applied research centers attached to the departments and ministries that use electronic equipment.

2. Applied research centers attached to industrial complexes or to the electronic industry centers.

To integrate the efforts of these centers and to prevent them from overlapping, the spheres of work of these centers and their role in developing the electronic industries are defined as follows:

Keeping up with the plan to develop the services, each center within its field of specialization, and drawing up a comprehensive framework for the centers according to a specific strategy.

Conducting early technical and economic comparison studies for the various projects connected with this kind of services.

Drawing up the detailed standards for the equipment to be produced locally or to be purchased from abroad so that these standards may be compatible with the definite strategy and in keeping with the international and local recommendations in which these centers are usually represented.

Constructing prototypes for some equipment.

Presenting the specifications of the equipment or of the prototypes of the research centers in the industrial complexes.

Following up the production of these prototypes with the research centers of the industrial complexes and making sure that the product complies with the specifications.

In case the equipment is for export, the research centers must draw up the right specifications so that the equipment may be acceptable in the foreign markets.

As for the research centers of the industrial complexes, they should carry out the following:

1. Establish contacts with the applied research centers attached to the departments and the ministries to acquire detailed specifications or the prototypes of the equipment to be produced.

2. Determine the equipment that they will produce in accordance with the company's production policy and with the marketing studies.

3. Draw up the specifications for the patented electronic equipment, instruments and parts and conduct private research on them.

4. Build the prototype for the product.

5. Act in concert with the production departments to develop the implementation technology and to improve the production economies.

To clarify this division, let us assume that what is acquired is to produce a broadcasting transmitter, for example. In case this project is started directly in the research centers of the industrial complexes, then it would be necessary to acquire the needed expertise on the latest technological methods and also to acquire international recommendations and agreements. This would constitute a heavy burden for the applied research center [of the industrial complex]. But if this expertise is offered the center in the form of final specifications or in the form of a modifiable prototype, then the center's role becomes limited, provided that the rest is done by the research center of the broadcasting engineering.

But if what is required is to produce an oscillescope, for example, then the work can be started directly in the research centers of the industrial complexes according to the marketing studies.

Recommendations

In light of the previous review, of the studies and research submitted to the council and of the debates, opinions and proposals of the members, the council has reached the following recommendations:

General Recommendations:

The electronic industries are considered, in addition to their direct connection with economic developments, among the national security and defense necessities in view of the importance of electronics in the modern defense and war systems.

Moreover, electronic equipment enters the various activities of the age. Backwardness in the electronics industry is considered a form of civilizational backwardness. This requires that the folowing considerations be taken into account in setting up and developing this industry:

The defense and security considerations as a basis for setting up and developing the military electronic industries and for strengthening the research centers specialized in this industry.

Economic and social considerations to provide communication utilities as a basis for producing and developing industrial electronic equipment, such as communication, control and measurement equipment.

Cultural and informational consideration calling for continuation of the production of the current consumer electronics and developing them to rise to the level of the international production in terms of quality and prices.

Along with the necessity of taking into account the considerations of the economic feasibility of the electronic components industry according to the type and importance of the product, [it is also necessary to]:

Coordinate the production of the various electronic industry units to prevent conflict and to lead to the integration of this industry. This can be done through creating a holding company or establishment that plans and coordinate the production of the various units and that sets up the technical units necessary to implement the phased industrialization policy capable of creating able and cooperative industrial entities.

Re-examine the present method of planning the electronic industries so that the plans may not be confined to setting the production volume and value only but may extend to complete advanced industrial phases. This is done by enabling the plans to introduce the basic industrial phases that start with designing the product, acquiring its components from the specialized international companies and then adding some local components, thus adding an industrial dimension to the production of electronics.

Re-examine the policy of the technical aid agreements to guarantee the transfer of the basic industrial secrets, such as:

The methods of designing and the right to innovations, along with training some Egyptian industrial leaderships in the foreign companies having the concession.

Transfer the technology of the modern electronics industry with its new industrial systems, especially the systems pertaining to the production of semi-conductives and to their use in the simple and multiple integrated circuits.

Release the freedom of importing the components suitable for the local industry from the various sources of specialization according to quality and stop the importation of component kits.

Re-examine the customs fees and the taxes levied on the production raw materials and requirements so as to guarantee proper customs protection for the various stages of industrial growth and to make it possible to supply the industry's products to the local consumer at suitable prices that are competitive with the prices of the foreign products in the local and foreign markets.

In the Sphere of Communications:

Link the communication utilities with the units of the electronic equipment industry needed by these utilities so that the production may be compatible with the local industrial capabilities and compatible with the needs of these utilities. This is considered a fundamental mainstay for industrial development and for the economic situation generally.

Develop the production of the Egyptian Telephone Equipment Company and increase the production volume to meet the expected increase in the demand for telephone sets and exchange equipment. During the models produced by the company to fit the models expected to be introduced into the telephone networks and which consist of electronic models with space and time sections.

Strengthen the Cable Company to enable it to produce the volume of cables required to meet the needs of the local network and of the axis cables.

Studying developing and bolstering the production of the television screens factory so as to use its products in the information-transmitting terminals.

Set up a new multiplex equipment industry, especially for time multiples.

Produce various types of radio communication equipment at a suitable economic volume so as to improve the provincial communications and to link them with a single automatic network that covers all parts of the country.

In Sphere of Electronic Computers:

Electronic computers are considered one of the fundamental aspects on which the modern civiliazation edifice is built. The rate use of these computers in the Arab countries--where the computers are needed direly--is due to the lack of computers that operate in correct Arabic. If the estimates for computers are calculated on the basis of their spread in a country like Japan, for example, in the past 10 years, then the volume required is no less than 3,000 units annually, especially since this product will be suitable to export to all the Arabic-speaking countries.

This industry's production may include some types of telex equipment designed especially to write in Arabic.

In Sphere of Military Electronics:

National security and defense requirements make it necessary to master the industry, technology and engineering of the military electronics because electronic war plays an important role in modern military operations. Therefore, it is necessary that the state possess the ability to produce and develop this kind of equipment.

In Sphere of Scientific Research:

There are several applied research centers that follow the various services, such as: The Radio and Television Union, the Ministry of Communications, the National Research Council and the Ministry of Industry. These centers are considered important supports that can play a significant role in strengthening and developing the electronic industries. This is in addition to the research centers belonging to the universities. The situation requires that the work of these centers be developed as follows:

These centers should undertake the task of planning and developing the electronics industry and of linking it with the sides for whose sake the industry has been founded.

The activity of these centers should focus on industrial production and the centers should undertake the task of drawing up the specifiations and designs for the various equipment needed, provided that they are equipped with units to produce the prototypes of the electronic equipment.

In the Sphere of Training:

Attention should be devoted to providing education and training in the electronic industries so as to enable the graduates to gain the highest degree possible of technical skills and expertise. This requires:

The widespread introduction of demonstration experiments using electronic means.

The use of modern electronic equipment for measurement and experiments.

Practical Training in the factories.

Establishment of training units in the factories and publication of pamphlets and documents describing the systems of work and its correct methods.

The establishment of pre-B.A. or post-B.A. disciplines to teach students and engineers the methods of designing by the use of digital computers.

Devoting attention to the documentation and familiarization [al-ittila'] centers and introducing the modern systems for acquring, storing and disseminating information.

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