PD-AAQ-521 SN: 37870

CLASSIFICATION

PROJECT EVALUATION SUMMARY (PES) — PART I

Report Control Symbol U-447

1. PROJECT TITLE	2. PROJECT NUMBER	3. MISSION/AID/W OFFICE
Telecommunications I, II, III	263-0054,0075,0117	USAID/Cairo

4. EVALUATION NUMBER (Enter the number maintained by the reporting unit e.g., Country or AID/W Administrative Code, Fiscal Year, Serial No. beginning with No. 1 each FY) 84-12

☐ REGULAR EVALUATION ☒ SPECIAL EVALUATION

5. KEY PROJECT IMPLEMENTATION DATES	6. ESTIMATED PROJECT FUNDING	7. PERIOD COVERED BY EVALUATION
A. First PRO-AG or Equivalent FY____ B. Final Obligation Expected FY____ C. Final Input Delivery FY____	A. Total $ _____ B. U.S. $ 242 million	From (month/yr.) June 1978 To (month/yr.) June 1984 Date of Evaluation Review October 1984

8. ACTION DECISIONS APPROVED BY MISSION OR AID/W OFFICE DIRECTOR

A. List decisions and/or unresolved issues; cite those items needing further study. (NOTE: Mission decisions which anticipate AID/W or regional office action should specify type of document, e.g., airgram, SPAR, PIO, which will present detailed request.)	B. NAME OF OFFICER RESPONSIBLE FOR ACTION	C. DATE ACTION TO BE COMPLETED
A. Actions/Decisions Presented in Evaluation Report which are considered Relevant to the Effective Implementation of the Ongoing Project:		
Provide additional outside plant inspectors.	ARENTO	February 85
Investigate quality control of cable placement and splicing.	ARENTO Contractor	March 85
Increase training on installation of outside plant.	ARENTO	September 85
Consider adding water treatment to the air conditioning system.	ARENTO	March 85
Use special subscriber features of new electronic switching exchanges to raise additional revenues	ARENTO	October 84 (accomplished)
Accelerate station installation.	ARENTO	June 85
B. Actions/Decisions to be Taken Regarding Future Project Development:		
Identify telecommunications activities and actions which can be undertaken by ARENTO with their own resources or as a part of a follow-on project to effectively build on institutional capability already developed.	USAID/ARENTO	June 85

9. INVENTORY OF DOCUMENTS TO BE REVISED PER ABOVE DECISIONS

☐ Project Paper ☐ Implementation Plan e.g., CPI Network ☐ Other (Specify)
☐ Financial Plan ☐ PIO/T _____
☐ Logical Framework ☐ PIO/C ☐ Other (Specify)
☐ Project Agreement ☐ PIO/P _____

10. ALTERNATIVE DECISIONS ON FUTURE OF PROJECT

A. ☒ Continue Project Without Change
B. ☐ Change Project Design and/or ☐ Change Implementation Plan
C. ☐ Discontinue Project

11. PROJECT OFFICER AND HOST COUNTRY OR OTHER RANKING PARTICIPANTS AS APPROPRIATE (Names and Titles)

AElAbd, DR/ID
THammann, DR/ID
TPearson, DR/ID
RvanRaalte, AD/DR
GLaudato, AD/DPPE
Abdelaty, DD

12. Mission/AID/W Office Director Approval

Signature

Typed Name Frank B. Kimball

Date 18 FEB 1985

AID 1330-16 (3-78)

NEAR EAST EVALUATION ABSTRACT

PROJECT TITLE(S) AND NUMBER(S)	MISSION/AID/W OFFICE
Telecommunications (263-0054, 0075, 0117)	USAID/Cairo

PROJECT DESCRIPTION
The project is designed to improve the telecommunications system of Egypt by (a) strenghening the planning, management, operating, and training functions of the Arab Republic of Egypt Telecommunications Organization (ARENTO) (b) rehabilitating and replacing major components of the system in Cairo and Alexandria.

AUTHORIZATION DATE AND U.S. LOP FUNDING AMOUNT	PES NUMBER	PES DATE	PES TYPE
August 1978 $242 million	84.12	July 1984	[X] Regular [ ] Other (Specify)
ABSTRACT PREPARED BY, DATE	ABSTRACT CLEARED BY, DATE		[ ] Special
LDowning, DPPE 2/4/85	AElAbd, DR/ID 2/4/85		[ ] Terminal

This mid-term evaluation of projects 263-0054, 0075 and 0117 (now being implemented as one integrated project) was conducted by three consulting engineers over the course of six weeks beginning May 15, 1984. The purpose of this evaluation exercise was to assess the progress and impact of the ongoing project activities and to assess the need for future program assistance.

The evaluation indicates good progess toward achieving the project purpose. In general, project inputs have been provided in sufficient quantity and quality. Contracts have been signed for all eight electronic switching systems of which five are installed and operating and the remainder should be in operation at the end of June 1985. Contracts are also being implemented for the construction of the outside plant network and significant progress is being made. The telephone switching equipment being provided is of high quality, requires little maintenance, and the cost has been reasonable. An ARENTO planning management unit is established and functioning; new training programs are in place; and an improved accounting, financial, and personnel system is being developed. While ARENTO's financial position is poor, its revenue generating capacity is expected to increase as services improve. The major impact of the project will be on the telephone using public who will have the ability to make telephone calls with a high probability of success. The consultants conclude that the project is being effectively managed and is producing the intended results at reasonable cost. In general, the telecommunications project is progressing well and while there are continuing problems due to the complexity of the construction program, such problems are being addressed and solutions are forthcoming. The extent of achievement of the project purpose will depend largely on ARENTO's ability to use project outputs on a continuing basis.

The consultants provided a long list of detailed suggestions for improving project implementation and recommended several follow-on activities. (Mission and ARENTO detailed comments on these recommendations are included as attached A and B.) ARENTO has already initiated actions leading to the implementation of many of the consultant's recommendations. Mission and ARENTO will review the progress in implementing these recommendations and will then discuss the need for providing further support. Providing already obligated resources to support the implementation of some of the other more critical recommendations will be considered as a part of the upcoming joint ARENTO/USAID exercise to program the remaining uncommitted project funds. Financing the implementation of some of the longer-term recommendations will be considered during the development of the Telecommunications IV project.

Lessons Learned

1) A capable aggressive Project Manager is important to the success of a project. Maintaining continuity on the project team will also have a positive influence on project success. 2) Equipment chosen should have a history of proven in-service results and be backed up by a reliable manufacturer. 3) The number of organizations involved in providing an overall service should be minimized to reduce coordination problems. 4) Institutional changes cannot be expected to be adopted quickly, but must be continually re-introduced. 5) The relatively short implementation schedules and reasonable costs incurred in this project for switching and outside plant relief could be used as a standard for other telecommunications project.

Executive Summary
Telecommunications Projects Nos. 263-0054, 0075, 0117

I. Overview:

A mid-project evaluation was conducted to assess the progress and impact of a three-tranche Telecommunications Project being implemented in part by the Arab Republic of Egypt National Telecommunications Organization (ARENTO). The Project Purpose included in the Logical Framework states: "Support and strengthen ARENTO's ability to more efficiently manage and operate the present Egyptian Telecommunications system in order to improve service to customers."

The project evaluation indicates good progress toward achieving the Project Purpose and the Program Goal. Contracts have been initiated for eight new electronic switching systems (ESS) and the necessary cables for installation in Cairo and Alexandria to replace old, obsolete equipment that was barely serviceable. Two of these new ESS installations are already in service and the remainder are planned for service later this year and in early 1985. These new switching exchanges and the new interconnecting circuits being provided will greatly improve service to existing customers and will provide service to new customers that have been waiting for many years.

ARENTO's current financial position is poor as their revenues do not cover their operating costs and interest on debt. However, they have the capacity to increase revenues as service improves and they plan to gradually increase rates in the future. Their technical capacity is improving and they have the nucleous of a good management team. The institutional recommendations included in the Telecommunication project will provide continuing improvement in ARENTO's capability to manage their expansion programs. There is a large, unfilled demand for telephone and data services in Egypt and in view of the progress made towards the Project Purpose, the evaluation report supports the appropriateness of AID follow-on assistance.

II. Summary of Project Impact:

The Telecommunications Project will have a major impact on the Telecommunications users in Cairo and Alexandria through the provision of additional subscriber capacity and greatly improved service. The electronic switching equipment being provided is of high quality and requires low maintenance effort. It is being provided at a very reasonable price which includes an effective training program for ARENTO maintenance people. The Project also includes major cable and fiber optic additions to the junction network that interconnects all switching exchanges in Cairo and Alexandria. When this network is completed in late 1985, it will greatly enhance the ability to complete telephone calls between exchanges which is currently a serious problem, particularly in Cairo.

The major impact of the Project, when completed, will be on the telephone-using public who will now have the ability to make a telephone call with a high probability of success. This is, of course, dependent on ARENTO's ability to provide the customer telephone installations in the new exchanges and to make a concerted effort to improve the maintenance of the existing crossbar switches.

III. Recommendations:

A number of follow-on recommendations are included in the evaluation report including the addition of new 1AESS exchanges in Cairo, the provision of a Switched Data Network for Egypt, a unified billing system for ARENTO as well as additional institutional, maintenance and expansion programs. This follow-on activity should further the achievement of the Project Goal and Purpose.

IV. Conclusion:

In the opinion of the evaluation consultants, the AID Telecommunications Project is being effectively managed and is producing the intended results at a reasonable cost. There are a number of problems being encountered which are to be expected in an undertaking of this magnitude. The problems, however, are known and are being adequately addressed. It is apparant that the project impact on the people of Egypt will be substantial with a positive reinforcement of relations with the United States.

EVALUATION REPORT

for

U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT
CAIRO, EGYPT

CONTRACT NO. OTR-0000-I-00-4142-03
Teleconsult Inc.
Washington, D.C. 20037

June 1984

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APPENDICES

I. Introduction:

Work Order No. 3 under Teleconsult/USAID Indefinite Quantity Contract OTR-0000-I-00-4142-03 was issued on May 11, 1984 to perform a mid-project evaluation to assess the progress and impact to date of a three-tranche Telecommunications Project being implemented in Egypt by the Arab Republic of Egypt National Telecommunication Organization (ARENTO) and to determine the need for additional assistance.

A team of three Teleconsult Inc. consultants was assigned to this task for a period of six weeks, starting on May 15, 1984. The consultants were:

Mr. R.L. Brown, Team Leader
Mr. J.C. Hoffman, Financial Analyst/Computer Systems
Mr. F.J. Mulholland, Training and Personnel

The consultants are all experienced telecommunications managers with many years in U.S. operating telephone companies and as consultants to telephone administrations throughout the world, including the mid-East. The team spent the early part of the period in reviewing pertinent documents, observing the progress to date of the major projects and discussing various tasks and undertakings with key personnel from the major contractors, ARENTO and USAID. The findings and recommendations represent the best views of the consultants based on the limited discovery period and the knowledge and experience of the consultants gained from first-hand experience with other developing telecommunications administrations.

The project evaluation was undertaken with full consideration of the environmental and cultural climate inherent in Egypt. Time tables and progress were evaluated based on the complexities and difficulties experienced in the extremely congested environment of Cairo and Alexandria and in light of the different cultural motivations and language difference experienced in the Arab Republic of Egypt. This evaluation report will address the various items covered in the evaluation scope of work included in the subject work order which is attached to this report as Appendix IX.

In summary, the consultants found that the Telecommunications Project was well managed by USAID personnel and that considerable progress has been made towards the program goal of a reasonably efficient telecommunications system capable of supporting Egypt's economic and social growth. The consultants are concerned, however, about the on-going capabilities of ARENTO to support a service-oriented, well maintained and efficient telecommunications system when faced with the high growth rates necessary over the next 15 years to satisfy the public demand for telephone service. An excellent start has been made, but can ARENTO continue the accelerated pace necessary to add some 250,000 lines per year up to the turn of the century without outside assistance? The consultants have attempted to address this question in the ensuing report.

II. Logistical Framework Progress and Observations:

A. Progress to Date in Achieving Outputs:

This paragraph will assess the progress to date in achieving the seven outputs in the LOGFRAME and their continued relevence in achieving the Project Purpose. Each output will be discussed individually.

Executive Summary
Telecommunications Projects Nos. 263-0054, 0075, 0117

I. Overview:

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ARENTO's current financial position is poor as their revenues do not cover their operating costs and interest on debt. However, they have the capacity to increase revenues as service improves and they plan to gradually increase rates in the future. Their technical capacity is improving and they have the nucleous of a good management team. The institutional recommendations included in the Telecommunication project will provide continuing improvement in ARENTO's capability to manage their expansion programs. There is a large, unfilled demand for telephone and data services in Egypt and in view of the progress made towards the Project Purpose, the evaluation report supports the appropriateness of AID follow-on assistance.

II. Summary of Project Impact:

The Telecommunications Project will have a major impact on the Telecommunications users in Cairo and Alexandria through the provision of additional subscriber capacity and greatly improved service. The electronic switching equipment being provided is of high quality and requires low maintenance effort. It is being provided at a very reasonable price which includes an effective training program for ARENTO maintenance people. The Project also includes major cable and fiber optic additions to the junction network that interconnects all switching exchanges in Cairo and Alexandria. When this network is completed in late 1985, it will greatly enhance the ability to complete telephone calls between exchanges which is currently a serious problem, particularly in Cairo.

1) "Planning unit established and functioning in ARENTO"
The planning function has evolved primarily into a project management office called PPMO (Planning and Project Management Office). Computer programs have been developed to assist in tracking the progress of turnkey projects and programs are in process to record the budget status over a 5-year planning period and to track loan committments and contract expenditures by projects. Also a Telephone Line Development Program for the second 5-year plan has been developed and projected to year 2002 as a fundamental planning tool. This represents progress in assisting ARENTO to control project progress and contracts and is in line with the Project Purpose. However, the consultants would like to see greater emphasis placed on annual construction program procedures to enable ARENTO to become self-sufficient in managing the large expansion programs anticipated over the next 15-year period.

2) "New Training Programs Installed."
The major contractors; ATTI, FACII, S.P. Wallace and ADLI/CPCI, are conducting or have plans to conduct training programs to enable ARENTO to maintain the equipment being installed. Some difficulties are being experienced in obtaining qualified candidates and in assuring appropriate assignments for the students after completion of outside plant training. Progress is being made, however, and training is considered to be an extremely important item in achieving the Project Purpose.

3) "Annual Procurement Plans Developed and Implemented."
This item will be discussed under III-A.2.d) below. It does not appear to have been adequately addressed to date, perhaps due to the reluctance of ARENTO to accept assistance in this area. Its relevence in achieving the Project Purpose is considered as essential now as it was when the LOGFRAME was initiated.

4) "Accounting, Financial and Personnel System Developed and Operating." A number of systems have been and are being developed primarily for mini-computer use. These include a simplified billing system, a payroll and personnel information system, purchase and stores systems and a Chart of Accounts system. These systems are designed for mini-computer, distributed batch processing and are effective in introducing data processing into the ARENTO organization which is advantageous in achieving the Project Purpose. It is recommended that ultimately, ARENTO should move towards a centralized, integrated data base system.

5) "Three rotary exchanges and related outside plant replaced."
This output has been modified to cover the replacement of all eight remaining rotary exchanges in Cairo and Alexandria with ESS and to replace the outside plant at six of these exchanges. This work is progressing well, as covered elsewhere in this report, and should aid in meeting the Project Purpose.

6) "Air Conditioning units and generators installed with training."
Nine X-Bar offices are being air-conditioned and training is planned for later this year for ARENTO O&M personnel. Consideration is being given to funding emergency generators at these offices. This item is progressing well and is a positive step towards achieving the Project Purpose.

7) "Other Telecom equipment being installed." This is a service improvement item from the original Project Paper and includes a Traffic Measurement System for the X-Bar exchanges located at Opera. The equipment is currently being installed and will provide junction usage data for the junctions terminating in the four Opera exchanges for maintenance and traffic forecasting purposes. The EADAS system in the COM centers will provide equivalent data for the ESS exchanges. Such data, if properly used, will improve junction-circuit availability and will provide a traffic usage base for trunk forecasting that is badly needed in the ARENTO organization. This item has continued relevence and should aid in achieving the Project Purpose.

Overall, indications are that the Project Purpose will be achieved (refer to Appendix VI). However, the degree of achievement is directly dependent on ARENTO's efforts to utilize the outputs on a continuing basis. The institutional recommendations are sound and the provided training is completely adequate if effectively utilized by ARENTO. The answer to the question "When will the Project Purpose be achieved?" is also a matter of degree. Service improvement has already been achieved to a limited degree and will gradually increase as additional exchanges are brought on line and as the junction network is improved. However, an appreciable improvement in customer service throughout Egypt is some years off and is dependent on ARENTO's ability to improve their management of the overall organization including the construction program/budget procedures and maintenance and repair of plant.

A review of the LOGFRAME Assumptions (Column 4) at the Goal, Purpose and Output level indicates that most are still valid. However, it is recommended that a third assumption be added at the goal level as follows (refer to Project Design Summary - Logical Framework in Project Paper):

> "3. ARENTO will seriously consider implementation of the consultants recommendations."

It is the considered opinion of the consultants that if success is to be realized in meeting the stated goal, this assumption must be true to a substantive degree. It is further suggested that the assumption at the Purpose level be modified to include the word "motivational" ahead of weaknesses. Many management and operational personnel are highly capable but the organizational motivation or incentive is lacking. If the ARENTO top management would revise the incentive system within ARENTO, many of the currently observed problems would disappear.

B. Appropriateness of AID Follow-on:

From a financial viewpoint, ARENTO's revenues do not cover their operating costs and interest on debt. As the loan grace periods expire, they will be saddled with additional debt repayment as well. However, it is felt that ARENTO has the capacity to increase revenues and, in fact, plans to do so on a gradual basis over the next few years. This should put them in a position to assume additional debt for plant expansion. Their technical capacity is adequate to handle plant expansion on a turn-key basis and, with continued emphasis on training, they have the capability to develop their

technical skills to an adequate level. Institutionally, ARENTO has the nucleus of a good management team. However, their key management is overworked and is more or less operating on a crisis basis. A more functional organization with clear lines of responsibility and the ability to delegate authority downward in the organization appears to be a must if ARENTO is going to become an efficient, service oriented telecommunication entity with the ability to satisfy the demands of the public on a timely basis.

It is apparant that ARENTO's top management fully intends to increase the ability to meet the telephone demand. Their current objective is to reach a telephone density of 7.2 telephones per 100 population by the year 2000 and the Chairman has stated that he would like to see this increased to a density of 30 telephones per 100. This is an ambitious program and will require the expenditure of large amounts of capital. It is understood that the European Consortium is making available upwards of $1.8 billion for European equipment at relatively low interest rates. U.S. suppliers will find it hard to compete in this atmosphere without U.S. Government assistance in the form of grants or low-interest loans. The policy of the U.S. telecommunication suppliers is to stand behind their product and to support it through at least a 20-year life. Once a foreign administration has had experience with this equipment and the continuing supplier support, a favorable reaction could establish a trend towards additional U.S. suppliers, particularly in terms of joint ventures for eqiupment and cable manufacture in the ARE. The consultants feel that this will not happen without U.S. Government financial assistance and therefore favor AID financed follow-on assistance in support of ARENTO's anticipated telecommunications expansion program.

C. Use of Donor Funds:

Foreign donors likely will supply nearly all the funds for ARENTO's future capital expansion based on ARENTO's limited ability to generate such funds internally. Ideally, all these funds should be provided to ARENTO at market rates to insure that capital expansion takes place in an economically efficient manner. However, most of the funds will be provided under conditions determined outside the scope of US direct influence. Loan financing from the European Consortium for example, is expected to be $1.8 billion in the next several years and will not be at market terms and conditions. Nevertheless, for economic efficiency reasons, USAID contributions of funds for ARENTO capital expansion should be reloaned or regranted by the GOE to ARENTO as near market terms and conditions as can be negotiated. The question of regrant versus reloan should be decided on the basis of the desired future debt/equity structure of ARENTO. At present this structure is not especially meaningful, but it will become important as ARENTO moves toward self-sufficiency in generating capital funds internally. Funds that are regranted by USAID for use by ARENTO as equity should by "costed" at an implicit return equal to the reloan rate in order to prepare the way for eventual evaluation of ARENTO's return on equity on a market basis.

III. Evaluation of Major Contracts:

A. Overall Telecommunications Project's Design Evaluation:

1) General: The Telecommunications project being evaluated evolved from the original loan of $40 M under Project No. 263-0054 (Telecom I) through two $80 M grants, Project No. 263-0075 (Telecom II) and Project No. 263-0117 (Telecom III) to the final $42 M Grant as an amendment to project 263-0117. Thus the three-tranche telecommunications project is now funded at a total of $242 million. While each of the Project Papers I, II and III identified discrete project activities, contracting requirements have forced a melding of these activities and the Project Paper Amendment dated May 1982 essentially covers all three projects and provides an overall modified scope of project components. The evaluation of the overall telecommunications project's design will therefore be based on the Project Paper Amendment.

2) Project Components: Each of the Project components will be discussed in turn with a brief statement on progress to date and adherence to the project design.

a) "Replace eight rotary exchanges (5 in Cairo, 3 in Alexandria) with new higher capacity ESS."

ATTI contracts were signed 20 February 1982 and the effective contract date was when the letter of credit was signed on 1 August 82. The resulting contract schedule is:

Exchange	Contract cutover date	Actual cutover date
Maadi	18 mos. = 2-1-84	12-15-83
Zamalek	22 " = 6-1-84	5-23-84
Helioplis	24 " = 8-1-84	on sched.
Bab el-Louk	28 " = 12-1-84	on sched.
Auto	30 " = 2-1-85	These exchanges
Ibrahimia	30 " = 2-1-85	may be delayed by
Gleem	30 " = 2-1-85	building work.
New Maadi	= 5-1-84	Up to 2 mo. bldg. delay.

The first two #1A ESSs' cutover ahead of schedule. Two more will cut on schedule and that the remainder could have cut as scheduled had ARENTO building and power work completed on time. -Overall, this component is progressing well and is adhering to the project design.

b) "Replacing existing outside plant and junction cables in six exchanges (3 in Cairo, 3 in Alexandria) with modern conduit and filled and screened cable."

Ford Aerospace & Communications Int'l (FACII) contract was signed 27 June 1982 and the effective contract date was when the letter of credit was signed on 18 Nov. 1982. The resulting contract schedule is:

Exchange	OSP Contract Compl. Date	Acceptance Date
Zamalek	15 mos. = 2-10-84	3-31-84 (prel.)
Heliopolis	17 mos. = 4-10-84	est. 10-30-84 (prel.)
Bab el-Louk	19 mos. = 6-10-84	est. 12- 1-84 (prel.)
Auto	21 mos. = 8-10-84	est. 12-16-84 (prel.)
Gleem	23 mos. = 10-10-84	est. 2-28-85 (prel.)
Ibrahimia	25 mos. = 12-10-84	est. 1-14-85 (prel.)

Outside plant construction in the Cairo and Alexandria areas is probably the most difficult part of the project to implement. A FACII Egyptian subcontractor,National Service Projects Organization (NSPO) is doing the manhole, duct and cable construction under FACII's supervision. This is an extremely difficult undertaking and although schedules are not being wholly met, considerable progress is being made. Sufficient outside plant was available to permit the Zamalek exchange to cut on 5-24-84. The Heliopolis exchange plant is approximately twice the size of the original contract and the planned 8-1-84 cutover will have to be accomplished on an outside plant sector basis rather than a complete cut. The ARENTO station installation forces are not adequate and thus the OSP delays will not impact new service starts appreciably, if at all. The service entrance wire provided by FACII is in accordance with specifications but is impracticable to use for the intended application. The 1000 station installations per exchange that are being supervised by FACII are therefore being made with plastic-insulated paired wire that is provided by ARENTO and is in common use in Europe. Overall, this component is progressing well in spite of many problems and is adhering to the project design.

c) "Providing technical assistance necessary for contracting and supervising the above mentioned installations."

The ADLI/CPCI consultancy contract which was signed 23 March 1980 has been effective in obtaining competent contractors at a reasonable price for the above mentioned installations. Their continued surveillance of construction in Cairo and Alexandria and the coordination of schedules with ARENTO, ATTI and FACII is effective in moving the project ahead in a relatively orderly manner in accordance with the project design.

d) "Providing technical assistance related to improving a wide variety of management and operations functions within ARENTO."

A detailed evaluation of the management and operations tasks is included in part B of this Section. While many of these tasks are progressing and will benefit ARENTO if fully accepted, it is the impression of the consultants that most of the effort is being applied on a piece meal basis rather than on an integrated system approach. The original Project Paper talked in terms of assisting ARENTO in developing a rational annual procurement plan or program projected out for a three to five year period so that all of ARENTO's proposed tender documents would conform with the annual procurement plan. It is the

consultants opinion that such an annual construction program planning and control system is absolutely necessary to plan, control and budget the massive construction programs envisioned for ARENTO over the next 10 to 15 year period. This is particulary true, starting in the 1986/7 period when ARENTO plans to discontinue large turn-key projects and obtain and install the majority of their growth plant without foreign assistance. It may be that ADLI/CPCI have provided those pieces that can be currently absorbed by ARENTO and that will assist them during the "turn-key" era. In this light, the management tools provided in these projects will be effective in assisting ARENTO to manage their turn-key projects and thus are considered to be a reasonable application of the Telecommunication Project's original design and is in adherence to the modified project design.

e) "Providing selected equipment, tools and test gear necessary to upgrade the general physical plant in Cairo exchanges."

A major portion of this item is considered to be the Sam P. Wallace contract to provide air conditioning for nine crossbar exchanges. The effective date of this contract was January of this year and the first two offices, Abassia and Pyramids, are progressing well and should be in service by mid-year. It is expected that the remaining offices will be completed on or ahead of schedule. This item should be effective in accomplishing the Project Purpose.

B. Assessment of Project Organization, Management and Structure:

Based on the extensive progress made to date, it would appear that no major changes are required in the project organization, management or structure. There were suggestions that the contractors should report to USAID rather than ARENTO in order to expedite approvals and requests for activities that are ARENTO's responsibility. This would require another layer of AID personnel and would dilute the interface between ARENTO and the U.S. contractors resulting in some loss of technology transfer and managerial OJT. The working interrelationship between the various parties is good with the possible exception of OSP inspections. Additional inspectors should be provided by ARENTO in order to allow the OSP construction projects to move ahead with as few delays as possible.

C. ADLI/CPCI Evaluation:

1) Task A-2, Program Management and Control:

The organizational purpose of this task was the establishment of planning and control systems to support the implementation of the proposed master plan. It was to include both Central Planning and Project Planning and Control. However, as covered in the Project Paper Amendment, this task was revised to focus primarily on project management only due to the great need for better management of the rapidly growing number of ARENTO construction projects. The Central Planning portion of the task was redesignated as A6 - Fundamental Planning and will be discussed in the following paragraphs (C-2).

A completely new Project Planning and Management Office (PPMO) has been set up within ARENTO and utilizes a mini-computer to track the progress of the USAID turnkey projects. Programs have been prepared to track the budget status by projects and loan commitments and contract expenditures, also by project. This represents good progress on project management in tracking the progress of the 1AESS installations and associated outside plant construction. However, there is an urgent need to establish an organized annual construction program procedure and authorization procedure to formalize the provision of plant process for future plant expansion. This is in line with the Sector Study and original Project Paper concept.

2) Task A-6, Fundamental Planning:

This task started in Phase I as Standardization of Purchased Equipment, Material and Services. However, it was not implemented as the consultants for this task were utilized to prepare ESS and OSP specifications associated with these procurements (Task C) which was considered to have a higher priority by ARENTO. During the Phase II negotiations, the scope of Task A-6 was revised to cover Fundamental Planning. The major fundamental planning effort to date has been to inventory existing and planned exchanges throughout Egypt and to project the demand by exchanges by years from 1987 through 1992 and for five-year intervals to the year 2002. These projections are based on an average telephone density of 7.2 telephones per 100 population by the year 2000. This represents an approximate average growth of 250,000 lines per year. ADLI has prepared a computer file of exchanges and anticipated growth that should be valuable in guiding ARENTO's growth plans through the next 5-year program and beyond. The file should be continually updated as the provision of plant materializes and more information is obtained on growth and demand patterns.

3) Task A-3 - Finance and Accounting:

A review of Task A-3, Financial Management Systems reveals that movement has taken place in a postive direction with success, but there is still considerable work to be accomplished. Design & Planning functions were completed and made available to ARENTO where they encountered some resistance to certain aspects such as: organization, chart of accounts, cash disbursements, budgets and auditing. Detailing functions for preparation and testing of those accepted items has had postive results as in payroll, partial chart of accounts and billing. Field testing and the preparation of field trials of the new computer systems has helped gain their acceptance. Implementation of these systems has been satisfactory.

The next most reasonable step in the payroll system is to add the personnel information files to the current payroll files when all ARENTO employees are being paid by this system, which should be November of 1984. This information is being gathered and or formulated and has been accepted for use by ARENTO for 1985 implementation. A further step for the payroll system would be to pay all employees by check rather than cash.

The payroll system which will contain all employees and their profile, which is currently being performed by a Service Bureau, should be moved in-house and run on a computer owned or leased by ARENTO for data security. With minor changes to the payroll system, many management reports can be derived from this data base.

A follow-on activity should be to develop a financial system with actuals and forecasts which, when complete, can produce current year actuals and a forcast, plus a long range financial plan extending it to a moving five year budget. This system should be in a format usable by top management of ARENTO for planning and management of ARENTO expenses and revenues.

4) Task A-4, Billing System:

The current billing system is operating in a satisfactory manner as designed by the consultants and ARENTO. After the start-up problems were resolved and Commercial Operations people became familiar with the computer output, its purpose of generating revenue input faster for ARENTO was achieved. A feature which would have been worth while in design could have been to incorporate past balances due on the current billing printouts. This would have aided the clerk, at time of customer contact, to resolve any difference that may have arisen and would improve ARENTO's image. It is hoped that this feature will be introduced in the unified billing system.

Assessing the proposed computerization of all billing systems which are now in use and planned will be a task of great benefit to ARENTO and its ability to collect revenue without the current delays. The problem that needs positive forethought is the sizing of each entity for the services rendered, keeping in mind the increase in national telephone system to be 250,000 lines a year for the next 15 years. Also the international telephone traffic will increase at a rapid rate as the national system increases. This will require new hardware which should be capable of processing and storage expansion without major expense.

The financial impact of these updated systems should be to improve the position of ARENTO revenues in the future.

5) Computer Skills:

Reviewing the various computer sections presently in ARENTO it is evident that they are well into the first stages of computerization. The extensive use of mini-computers with off-the-shelf programs and some minor program changes has served them well for their present needs. There does not appear to be a cadre of software programming talent within ARENTO which will be required eventually. The consultants and their counterparts in ARENTO have successfully moved ARENTO into computer technology at a reasonable rate of speed.

In the near future, ARENTO will need, with their growth pattern, a next step generation in computerization technology. Several aspects in organization, facilities, hardware, software and a programming force are recommended. In organization, there is need for a Sector Chief whose only responsibility should be data management for all of ARENTO. This person should be chairperson of a user committee consisting of a member from each group using data services. The operation, selection of equipment and dealing with out-of-house services should be part of the position. When considering the facilities portion it would be in ARENTO's best interest to plan now where to locate a computer processing center. Due to the lead time required for construction of such a facility, a plan should be implemented as soon as practical.

Hardware and software considerations will dictate the size of the data center and it should be constructed with growth in mind for a 5-year period. A multi-vendor environment appears to be present in all D.P.C.'s in operation today and ARENTO should include this in their plan. Space needs should to be alloted for the moving of some of the present mini-computers to the DPC. The use of conditioned space, no-break power, air and raised floor are basic requirements. A minimum half-meter raised floor should be provided. The software considerations to be aware of are whether purchase or lease arrangemets should be used and that the operating system of the computer should be the latest available and maintained up to date under contractural arrangements. This will produce a higher level of computer up time.

The need of a programming force will become more evident as the growth in services increases. There are two types of programmers needed, the business applications type and the operation systems type. The systems type could be as few as two people, the number of business applications programmers will be in relation to the number of system users and the computer language's used. A current review of Task A-8 should be undertaken prior to implementation of a new data organization due to the fast changing pace of data technology.

6) Task A7, Managerial and Technical Training

This task was accomplished during the period July 1980 to May 1982. The objective was to substantially expand and improve the capability of ARENTO to provide training.

The basic deliverables of the contract were completed by the ADLI/CPCI consultants with one exception: The training for Future Management Instructors in the U.S. was deleted at the direction of ARENTO.

The ADLI/CPCI consultants took appropriate action on all of the sub tasks as follows:

Category 1: Integration

Working relationships were established with the ARENTO training organization. The training and manpower planning needs of ARENTO were examined and priorities of work were established. Testing procedures were established and several selection tests were made available for ARENTO use. Some of these tests were used to screen prospective students for the training presented under the various USAID Telcommunications Project contracts. The consultants assisted in the preparation of the training specifications for USAID and European Consortium Telecommunications Project contracts.

Category 2: Expansion of Training Output

A survey was made of available management training resources in Egypt including government, universities and private institutions. Technical training courses were adapted and translated into Arabic. Instructor training and management training courses were introduced. Instructors were trained and orientation classes covering on-the-job training methods

were given. Seminars for senior management were held and middle management training was presented to 62 students., A supervisor's training audio tape program was adapted and translated into Arabic. Equipment was procured for producing training material and for delivering the material in the classroom. The USAID funded equipment included a printing press, TV cameras, cassette recorders, camera, transparency maker, cassette players, film projectors, video cassette player-monitor and other items.

Category 3: Expanding Training Capacity.

Course developers were trained and four new courses were developed. A five year plan for the training sector was prepared and submitted.

It is concluded that the contract was adequately fulfilled and that immediate benefit to ARENTO was achieved. This task assisted in making the training presented by the other USAID telephone project contractors more effective. See Appendix 1-A, Training Summary.

The long term results are less than desired because many of the recommendations submitted as part of this task have not been adopted. However the positive results of this contract work are observable in the training presented by ARENTO.

7) Maintenance and Operation:

a. Four Consultants from CPCI are assigned to assist ARENTO with Maintenance and Operations. Their specialties are:

- o Outside Plant
- o Switching Equipment
- o Fault Analysis
- o Junction Facilities

They have made a significant contribution by working closely with their counterparts to improve their individual areas of concern. They cannot accomplish all that requires changing because a four-man team is not adequate to solve all the problems that exist. The cooperation that they receive from ARENTO management and technical personnel is good. The ARENTO personnel seek their advice and assistance on technical problems and emergency situations that develop.

Examples of the Maintenance and Operations accomplishments are included in Appendix III.

b. Additional hardware is required to assist in improving the maintenance and operations. It is relatively minor in terms of total expenditure but the resulting improvement would be significant.

- o Mini-computers for the Fault Reporting system to handle customer complaints: It is recommended that a mini-computer be provided for each major exchange and that two maintenance spares be provided.

- o Adequate test equipment and repair parts for existing test boards in crossbar offices: It is recommended that this requirement be studied in detail and that adequate test equipment be provided for each exchange.

- o Hand tools for station installers: It is recommended that funds be provided to equip each station installer with adequate tools and that a tools replacement program be funded.

- o The wire and hardware used for station installation and the procedures are not adequate. This is a weak link in the American provided switching equipment and cable system. The most likely part of the system to fail is the wire from the distribution cable terminal to the telephone instrument. The standard procedure developed during Phase I is not used. It is recommended that a program be funded to replace all existing defective service wire installations.

D. ATTI Evaluation:

1) Cost Reasonableness: The per line cost of the original 1AESS is considered to be low in comparison to comparable switching equipment available from other manufacturers.

2) Selection and Soundness of Contract: Two bids were received in response to the IFB. The two switching systems evaluated as being compliant with the request for proposal were considered essentially equal in capability. The choice was made on cost. The ATTI price was significantly lower than the GTEI price.

The contract between ARENTO and ATTI is good and is fair to both parties and has proved to be workable in practice. The provisions covering pricing of additional equipment are equitable.

3) Overall Performance:

(a) Switching System: With a few exceptions the 1AESS switching system is the same as the switching system used extensively in the Bell Operating Companies in the U.S. Changes such as a different type of signalling were made to adapt the system to the ARENTO requirements. This system can be expected to give good service for more than 20 years. The system has many capabilities that can be activated at no cost when ARENTO is ready to offer the additional service features to its subscribers. Western Electric, the equipment manufacturer, can be expected to support this equipment for many years with improvements when needed, readily available replacement parts and additions at reasonable cost due to the demand that will exist for this support from the Bell operating companies. In summary, the 1AESS is considerd an excellent choice in all respects for the ARENTO application.

(b) Air Conditioning: Adequate air conditioning and humidity control is provided for each equipment room including the COM Center. The buildings require additional sealing to restrict the entry of dust but this can be accomplished by the air conditioning maintenance personnel during the period preceeding final acceptance. The use of electrostatic particle precipitaters should be investigated to replace the air intake filters used with these systems.

(c) Emergency Power: Standby motor generators are provided for automatic assumption of the electrical load in the event of commercial power failure. This, combined with the battery plant, will assure uninterrupted service from the system.

(d) Fire Protection: The fire protection system as originaly included was adequate. The fire detection system provided is adequate but the Halon fire extinguishing system was removed from the contract. It is not practical to depend on any fire department to protect telephone equipment. The equipment can be badly damaged or destroyed without sustaining any actual fire damage. The greatest danger lies in having the system out of service for an extended period. Water or the wrong chemical extinguisher can cause severe damage to the system. A carbon dioxide system will not damage the equipment but it could be dangerous to personnel caught in areas where they can not exit quickly. Halon does not damage the equipment, humans can exist in the gas for an extended period without adverse effect and it will quickly extinguish a fire. A negative consideration is that Halon gas is relatively expensive to replace when used as compared with carbon dioxide. It is recommended that Halon be supplied as originally planned.

4) Performance Measurements:

The 1AESS switching systems include sophisticated data collecting and recording capability. It produces information necessary for:

- o Engineering and forecasting equipment additions.
- o Administering the equipment efficiently.
- o Monitoring local outside plant.
- o Monitoring the exchange equipment.
- o Monitoring performance of connecting and remote exchanges.

The two exchanges now in service have no significant internal problems. This is reported by periodic print outs from the monitoring system. Significant problems are being identified in the outside plant within the exchanges. Most are apparantly caused by stations being connected to wrong cable terminals and jumper errors. The monitoring system reports this information and the reports are given to ARENIO for action.

Many problems in the existing crossbar exchanges and in the junction plant are also reported by the monitoring system. These reports are given to ARENIO for action.

The system peformance measurements appear to be adequate and, if properly used, will lead to significant improvements in the ARENIO plant as action is taken to clear the identified problems.

5) Training:

The training being conducted for ARENTO engineers and technicians is producing trained personnel capable of maintaining and operating the 1AESS equipment and they are being assigned accordingly. ARENTO instructors have been trained to continue the courses. See Appendix IB

6) Operation and Maintenance:

The ATTI contract includes operation and maintenance of each exchange and the CCM Center for one year with an additional one year as an option. The ATTI personnel are performing these functions in the two exchanges now in service. Trained ARENTO personnel are working with them to gain experience. Excellent performance results are being achieved.

E. Ford Aerospace and Communications International Inc. Evaluation:

1) Cost Reasonableness: Based on the magnitude and type of outside plant being installed and the estimated contract cost including training and contingencies, the price is considered to be very reasonable, particularly since the plant is all underground or buried.

2) Selection and Soundness of Contract: A review of the competitive selection process indicates that a sufficient number of bidders were prequalified (7), out of which three bids were received. Of these, two were considered fully responsive and were completely evaluated as to quantities and prices. The FACII bid was the lowest bid at 86% of the ATTI bid and was judged to be from a responsible bidder and was awarded to FACII. The resulting contract is sound and in accordance with the IFB requirements.

3) Overall Performance: A number of field visits were made to inspect the outside plant projects underway in Cairo and Alexandria and schedules and progress reports were reviewed. Also, discussions were held with FACII management, CFCI and ARENTO personnel. The outside plant construction in the densely populated areas of Cairo, and to a lesser extent Alexandria, is the most difficult part of the overall project. Traffic conjestion, narrow streets, the unknown location of other utilities and the obtaining of permits are only some of the problems confronting the construction forces. The use of NSPO as the construction sub-contractor was a wise choice as considerable progress is being made under extremely difficult circumstances. The consultants were impressed by the attitudes of the FACII construction foremen interviewed which was the general conviction that when they were through, ARENTO would have a network that would meet the contract specifications and would provide a good grade of service to ARENTO's subscribers. However, from discussions with CFCI outside plant consultants, it appears that there are some quality control problems being experienced with cable placement and splicing. This should be further investigated.

Some delays are being encountered in meeting contract schedules, particularly in Heliopolis, Bab el Louk and Auto. It is understood that the Heliopolis outside plant network is currently double the size of the original network on which the schedule was based and that appreciable delays are being incurred in many sectors by late construction permits from Government bodies. FACII is also experiencing delays in ensuring that NSPO maintains quality standards and in obtaining access to ARENTO provided cable vaults and buildings. Efforts should be made to reduce these delays in order to ensure timely and successful cutover of 1AESS exchanges in accordance with desired schedules.

From a broad point of view, however, indications are that FACII and their NSPO subcontractor are making progress under extremely difficult circumstances and that the overall quality of the resulting outside plant is adequate and generally in accordance with specifications.

4) Training: FACII is conducting training for ARENTO personnel covering many facits of outside plant including fiber optic cable. There are some coordination problems in getting the ARENTO students assigned to the scheduled courses. The training is effective for the students who attend. The trainees who complete the courses are not all being assigned to jobs where they can utilize the skills learned. See Appendix IC.

ARENTO should put greater emphasis on this training. The problems in the new exchanges are essentially all in the outside plant. Most of these problems are created by not giving proper attention to record keeping in the activation of wire pairs from the MDF to the SAI to the DCI. The classes presented by FACII cover these operations and could prevent the problems from occurring.

5) Operations and Maintenance: The FACII contract includes operations and maintenance of the exchange outside plant for one year with an option to extend the agreement for an additional year. Operations and maintenance for junction plant is being negotiated by FACII and ARENTO. FACII is equipped to perform the C&M function which consists mainly of fault repair. Cable faults probably will not be a major problem during the maintenance period. FACII is not responsible for jumpers on the MDF and in the SAI and is not responsible for installing and maintaining the service wire except for supervising ARENTO personnel during 1000 installations in each ESS exchange area. FACII will use test equipment and employees presently in Egypt and will subcontract local labor to accomplish the operations and maintenance.

It is recommended that FACII take over the responsibility for installing and maintaining the service wire and the telephone instruments in each ESS exchange area during the maintenance period.

F. Sam P. Wallace Evaluation:

1) Cost Reasonableness: The contract price of approximately $3.9 million for the replacement of units and parts for Air Conditioning Systems by Sam P. Wallace of Dallas, Texas is completely reasonable in view of the magnitude of the building refurbishing work entailed in the nine ARENTO offices included in the contract.

2) Selection and Soundness of Contract: Three bids were received in response to IFB No. 6-81-17 advertised in the CBD. The Sam P. Wallace bid was the lowest of the three; the next lowest bid being 137% of the Sam P. Wallace proposal. An in-depth analysis of the SPW bid proposal was made by ADLI/ARENTO and was found to be fully responsive and from a responsible contractor using industry accepted equipment. The selection process was judged to be in accordance with accepted standards and the resulting contract is sound and well documented.

3) Overall Performance: The installation progress at the Abbassia and Pyramid exchanges was reviewed by the consultants. The contractor appeared to have the work well under control with a minimum of problems. Good progress was being made and the contractor expects to complete the nine office installations ahead of schedule. The quality of workmanship appeared to be good and the installations were well supervised. The contractor strongly recommended that water treatment be added to the systems (not presently included in contract) to reduce scaling in the pipes in order to increase the system service life. It is understood that this recommendation has been made to ARENTO and, based on the contractors extensive experience in Cairo, the consultants feel that serious consideration should be given to this recommendation. The costs are understood to be minimal in view of the expected increased service life.

It is the consultant's opinion that the Sam P. Wallace contract implementation is proceeding extremely well under competent contractor supervision. Of course, the complexities inherent in this type of installation are considerably less than those inherent in the outside plant construction project.

4) Training: The training associated with the replacement air conditioning equipment being installed under the Sam P. Wallace Company contract has not yet been scheduled. The class dates and number of students are being discussed with the ARENTO authorities. The training schedule will be submitted on June 28, 1984.

The training to be provided consists of three increments:

- Field Instruction, at least 3 eight hour days at each exchange.
  ARENTO representatives will be instructed in proper operations and maintenance of electrical and mechanical systems upon completion of work.

- Start-up Supervision
  The equipment supplier for the air handling units will provide instruction to ARENTO's maintenance personnel in all aspects of the equipment operation, maintenance and troubleshooting techniques.

- Formal Training Program
  Includes classroom and on-the-job training. The course will cover basic electricity, basic refrigeration, advanced electricity, advanced refrigeration, electrical troubleshooting, refrigeration troubleshooting and liquid chillers. Sophisticated electrical and mechnical training aids will be provided and will become the property of ARENTO. See Appendix 1-D for course outline.

5) Operations and Maintenance: Operation and maintenance of the air conditioning systems provided by the Sam P. Wallace Inc. contract will be accomplished by AREMIO personnel. Assistance will be provided by the contractor during the start up and testing period.

The equipment will be covered by a warranty for 12 months after the provisional acceptance. During this period the contractor will inspect the systems at each exchange four times at approximately three month intervals. These inspections will include assistance required by the AREMIO operating personnel and the adjustments and calibration that may be required to the equipment.

The contract provides for spare parts, storage racks and a spare parts inventory and management system. Also provided by the contractor are service tools, test and adjustment instruments, maintenance and operations manuals and equipment drawings.

IV AREMIO Performance:

A. Non-Project Factors:

There are a number of non-project factors that impact the Project Goal and Purpose. Some of these factors are enumerated in this section for information only as the solutions are complex and are not considered to be within the realm of the project. Probably the most crucial non-project factor is the lack of motivation of the AREMIO lower management and non-management employees. Pay scales are not competitive with the private sector or with other Mid-East administrations such as Saudi Arabia. As a result, there is a tendency for qualified employees to leave AREMIO for higher-paying positions after obtaining experience and training with AREMIO. Further, there is little recognition of employee merit; longevity and formal education seem to be more important than accomplishments. A hesitation to delegate authority downward in the oragnization appears to be another non-project factor that retards orgnizational performance.

Unplanned or indirect project impact could be extensive as the Project Goal is achieved. For example: the investment climate for private business is highly dependent on good, readily available telephone and data services. Multi-national corporations, financial institutions and international businesses in general will not migrate to Egypt if telecommunications services are poor or unavailable. Many Mid-East locations are competing for businesses moving from Beirut and Iran as an example. Also, expansion of Egyptian corporations within Egypt is hampered by a lack of available telecommunications. Even the severe traffic conjestion in Cairo might be noticeably eased if good reliable communications were available to transact business and make social contacts by telecommunications, rather than in person. The Project Goal cannot help but have a favorable impact on the quality of life in the Arab Republic of Egypt.

B. Tariffs:

Experience indicates that an efficient, well-managed telecommunications organization should be able to generate sufficient revenues to defray expenses and earn a reasonable return on investment. In other words, a telephone company is a profitable business. However, the tariff structure must be well designed to meet the revenue requirements at a reasonable cost to the public.

A review of ARENTO's current tariff structure (refer to Appendix VII) indicates that some progress is being made in this direction. However, even with the January 1982 rate increases, the revenues do not meet ARENTO's revenue requirement. ARENTO is aware of this and plans to make further adjustments in the near future to bring revenues more in line with requirements. Thus progress is being made in fulfilling the tariff covenant. However, the rates and tariffs group included in the covenant has not been established at this time.

It is anticipated that as service improves, the public acceptance of rate increases will also improve and that rates can be made more comparable with other similar countries. In this light, it is recommended that a continuing effort be made to increase toll and local rates to gradually increase ARENTO's financial position. It is also recommended that advantage be taken of the special subscriber features inherent in the new electronic switching exchanges to obtain additional revenues as soon as adequate billing arrangements are available.

C. Financial Condition/Project Covenants:

1) Financial Condition: ARENTO's financial condition as stated in their 1982/1983 fiscal report shows progress over the previous year. After a study of the report there are some findings which need further attention; for example, as of May 1984, ARENTO indicates 23% of financing for construction coming from self-financing with only 6.4% from net income and 54% from long term loans. The impact of grants from USAID are being felt for the first time in 1982/1983. Deducting these grant amounts from the self-financing figure and adding them to the long-term loan figure will give a true picture of ARENTO's dependence on outside financing sources. The respective percentages are then 18% from self financing and 65% from long term loans. The actual figures appearing in these financial statements are difficult to verify. Orders of magnitude, however, appear to be reasonably accurate.

The forty percent increase in revenues in FY 83 unquestionally improved ARENTO's income and balance sheets, but it is difficult to translate ARENTO's accounts into more traditional accounting statements. ARENTO assets have been revalued, as covenanted, but this revaluation has not been reflected in ARENTO's published accounts. Accordingly, it is difficult to evaluate such factors as return on assets or equity. The debt/equity ratio has improved, as covenanted but this appears to be largely a result of the $20 million in U.S. funds that was granted to the GOL and passed on to ARENTO as equity. Under such conditions, the debt/equity ratio is relatively meaningless. What is clear is that "despite marginally improved financial ratios in the several years to come, ARENTO dependence on long term external debt financing will be nearly complete".

On the cost side, the financial picture of ARENTO was dimmed by a 26 percent increase in total operating expense: commodities and services increased by less than one-half million LE (6 percent), but wages and related payments increased by more than 15 million LE, a 31 percent gain. In view of the covenanted freeze on ARENTO staff and the small increase in numbers of phones in service it is difficult to explain the sharp jump in wage costs, and raises the question as to the tie between revenue increased and wage cost increases through the bonus system, or by other means. Any semi-automatic pass through of revenue the increases to wages would further incumber an already fragile profit generating ability.

The keeping of detailed accounting records of disbursements from all sources, something not presently being performed in ARENTO, will be increasingly important in the future.

2) Progress on Financial Covenants:

"Covenant B" - Tariff Rate Structure: Refer to paragraph B above.

"Covenant C" - Revaluation of assets in ARENTO: Significant improvement has been made and the revaluation has been completed. The revaluated assets however, have not been booked as of this writing.

"Covenant E" - Transfer of 20 Million LE from debt to equity: The transfer of this 20 Million from debt to equity is in effect only an accounting procedure and not debt relief. This covenant should be deleted.

"Covenant F" - The maintenance of a 70:30 debt/equity: Current debt/equity is 83.7:16.3. The present tariff levels will not relieve ARENTO of its poor financial position.

"Covenant H" - Progress of collection of GOE telephone service payments: The collection of arrears payment has deteriorated from 6.7 million LE to a much larger number. ARENTO's books do not show an uncollectable account for revenue.

3) Recommendations: The use of covenants is not an effective process for accomplishing financial or accounting changes. A better method to effect change would be to include those necessary covenants as Conditions Precedent.

D. Institutional Capacity:

1) Task A-1, Organization: Task A-1, Recommendations for an ARENTO Organization Structure was prepared by ADLI jointly with ARENTO. The task A-1 Report was issued in May 1982. The organizational structure proposed was to enable compliance with PL 153 and to structure the organization to meet the changing needs for telephone expansion without a major disruption of the existing organization. A schedule of priority steps was included in the report with expected completion around mid-1983. This restructure has not materialized although some progress has been made. For example, just recently a Corporate Planning group was organized to report directly to the Chairman as recommended. Other steps have also been taken such as the establishment of a Planning and Project Management Office (PPMO) to track the progress of major projects. Other recommendations such as the consolidation of the financial functions under a new Vice-Chairman whose sole responsibility would be to manage the financial affairs of ARENTO has not been implemented.

The consultants brief exposure to the ARENTO organization was sufficient to indicate that a number of ARENTO's management personnel are extremely competent and dedicated to ARENTO's goals. However, they can not do the job alone, particularly in view of the large anticipated expansion program. It is essential that these capable managers delegate authority downward in the organization and develop capable managers at the lower levels. The recommended organizational structure is based on functional lines with more clearly definied areas of responsibility. Adherence to the organizational recommendation, with modifications as experience is gained, should improve the effectiveness and efficiency of the ARENTO management team and it is recommended that serious consideration be given by ARENTO to continued implementation of the organizational structure recommendations.

2) Training: (The Telecommunications Research Institute is now called the ARENTO Training Center.)

The training center is capable of supporting all training that is required by ARENTO.

Training for the 1AESS switching system is being conducted at the center currently. A training switch with accompanying outside plant is being installed for this training, but it is not in use at present. When this training device is completed, the center will be equipped to effectively train technicians to operate and maintain the ESS switching system. The training is being presented under the ATTI contract by ATTI personnel assisted by ARENTO instructors. It is adviseable to continue to use consultants to manage this training program, supplemented by trained ARENTO instructors.

The number of students completing the 1AESS course is adequate to maintain and operate the exchanges that are being installed in Cairo. There is a problem with trainees for the Alexandria exchanges because the Alexandria personnel refuse to come to Cairo for training. Behind this refusal is the ARENTO policy of not providing adequate quarters, food, transportation or funds with which to pay for these necessities. The classroom instruction can be moved to Alexandria but the practical work on the training switch must be accomplished at the training center.

FACII conducts outside plant training at the training center for ARENTO personnel. The facility is adequate for this training but the attendence has been poor. FACII is also conducting refresher training for NSPO cable splicers and training for new men as they come in as replacement splicers. The training is conducted after working hours and it is out of the FACII scope of work. It does benefit Egypt and ARENTO in that it will result in a better built telephone system.

The Training Center is conducting outside plant, crossbar maintenance, teletype operator and other craft training when requested by the ARENTO organization. Management training was introduced during phase 1 and it is being continued. Training switches have been installed for the various types of switching equipment used by ARENTO and training is conducted on them when required.

The problem of not agressively pursuing an active training program to support the needs of ARENIO is deeper in the organization than the Training Sector or Training Center. Before a structured training program will emerge, ARENIO must be willing to recognize the ongoing training need and support a program to fulfil this need. In the interim, the actual recognized needs are being met. Each switching equipment manufacturer provides training for the ARENIO personnel who will be assigned to work on the equipment. The system provides for the minimum requirement even though it leaves the contractors and consultants feeling uncomfortable because it is not self perpetuating. Assuming that ARENIO will continue in this mode in the near future leads to the conclusion that the training center can best facilitate this system by improving its present performance while preparing to meet a broader role. The following actions are recommended:

- To be a better host organization the physical plant should be kept clean. Attitudes are established at schools.

- Provide and maintain adequate classrooms and training aids. At least five more classrooms similar to the existing model classroom should be provided.

- Make available actual equipment units and test equipment of the latest type to the training center for use as training aids.

- Arrange for adequate housing and food for out-of town students. Building space is available but furniture and fixtures should be provided.

- Arrange for transportation to and from the training center for all students. Transportation is also required for on-the-job training. Several small busses and a maintenance contract to keep them running should be provided.

- Provide a student support office to solve the problems of the students that are brought about by changing their routine to attend school. Removing the incidental problems will assist the student in giving maximum attention to classwork.

In addition to these near-term actions, the Training Center should be prepared to support ARENIO management in fulfilling the training requirement by the following actions:

- Continue to maintain a cadre of instructors who can assist or replace the contractors in any of the ongoing training courses. This will ease transition if the ARENIO policy should evolve to the point where ARENIO instructors are used extensively.

- Confer with the various levels of management to the greatest extent allowed by organizational procedures to determine the training needs of each sector and subsector of ARENIO.

- o Actively seek a means of having budgeted funds provided for necessary training support not presently funded.

- o Stay current with international training method advances and maintain a library of technical and training material available from the various telecommunications organizations.

- o Expand the present function of preparing practices covering methods of operation and installation and maintenance. This is an extremely important means of achieving uniformity and establishing standards of performance.

It is recommended that four additional consultants be authorized to work with the Training Center personnel to achieve these results. One should be assigned to work for the Chief of the Training Center to assist him in agressively promoting training in ARENTO and in implementing the recommendations submitted during Task A-7. One should be assigned to assist in the development of the practice system and the technical library. One should be assigned to assist with improving the physical condition of the training center, procuring and maintaining the training aid equipment and developing the student support facilities such as housing and transportation. The fourth consultant should be assigned to work in course development as requested by ARENTO.

Due to an apparent problem of obtaining small amounts of money to purchase consumeable and repair parts for training aids, to pay for repairs accomplished by outside organizations and to pay for other goods and services normally required, it is recommended that a small cash fund be provided for this purpose to be administered by the consultant team leader until such time as the ARENTO administrative structure makes it no longer necessary.

3) Operations and Maintenance:

The Operations and Maintenance Department is responsible for the functioning and the condition of the ARENTO telephone plant. The results have been unsatisfactory but they are improving with the addition of new outside plant and new switching systems. Appendix IV includes detailed recommendations for improvement in the following areas:

- o Installation and Repair of Telephone Service Wire and Instruments
- o Exchange Switching Equipment
- o Outside Plant
- o Test Equipment
- o Utility Coordinating Committee
- o Records
- o Building Industry Representative
- o Procedural changes

V. Project's Major Beneficiaries:

A. Direct Beneficiaries:

The direct beneficiary of the Telecommunications Project will be the telephone users in the ARE and specifically those users and potential users in the 1AESS exchanges in Cairo and Alexandria. The junction network improvement will also directly benefit all telephone users in the two cities as well as those national and international users who have need to communicate with Egypt's two major cities. In addition, ARENTO, and in turn the GOE, will be direct beneficiaries through increased revenues and reduced public complaints. The public image of ARENTO should improve significantly after the successful completion of the AID Telecommunications Project.

B. Indirect Beneficiaries:

An indirect benefit of the Telecommunications Project is the increased good will of the Egyptian people towards the U.S.. This is a somewhat intangable benefit but could be enhanced by appropriate public relation action so that the telephone using public, at least, recognizes the U.S. contribution towards improved service. The consultants have been impressed by the local positive reception to Americans exhibited by a wide strata of Egyptians and this American Good-will should be encouraged as a return on US tax dollars.

From the viewpoint of the GOE, an indirect benefit is the improved telecommunications infrastructure which will attract international business headquarters to Egypt and will improve the administration of GOE agencies and ministry. It will also enhance financial institutions through more rapid funds transfers as well as tourism and even the defense posture of the GOE. A healthy telecommunications organization should also contribute revenues to the GOE rather than function as a subsidy drain.

VI Recommendations:

A. Corrective Actions:

In general, the telecommunication project is progressing well and while their are continuing problems, such problems are being addressed and solutions are forthcoming. The attainment of the Project Goal of "a reasonable efficient Telecommunications system" would have been accelerated had the turn key projects been expanded to include the building refurbishment with the switching installations and to include station installations with the outside plant work. In the former case, it is understood that the European consortum Siemans included the building work in their turn-key project and were able to control the local building contractors occupancy dates with minimum delays. ARENTO concurs that fewer building problems were encountered in the Siemens installation and would favor including this work in future turn-key equipment projects. In the case of new station installations, service starts in the new 1AESS exchanges are being delayed by the limited capability of ARENTO to install and connect the new and replacement subscriber instruments. The inclusion of this work as a part of the CSP turn-key project would have provided improved service to customers through expedited installations as well

as an earlier return on investment in plant through earlier new service starts. In addition, improved public reaction would be realized earlier due to the reduction in held orders. The additional turn-key costs of this effort could, in part, be covered by earlier revenue generation. The use of ARENTO installation forces to assist in this effort would provide valuable, on-the-job training for future ARENTO installations.

B. Lessons Learned:

Several observations will be made on lessons learned that could be applied to follow-on or similar project work.

1) A capable aggressive Project Manager is important to the success of a project. Maintaining continuity on the project team will also have a positive influence on the success of the project.

2) The equipment chosen should have a history of proven in-service results and be backed up by a reliable manufacture.

3) The number of organizations involved in providing an overall service should be minimized to reduce coordination problems which have proved to the difficult in the international business environment.

4) Hardware implementation is more readily accepted than are institutional changes such as organizational restructuring. These changes can not be expected to be adopted quickly, but must be continually re-introduced with tact and light pressure.

5) The relatively short implementation schedules and reasonable costs incurred in this project for switching and CSP relief could be used as a standard for other telecommunications projects.

In conculsion, the consultants feel that the Telecommunications Project has been well managed by a capable and knowledgeable Project Manager and team which has had a positive impact on the success of the project to date. The equipment suppliers are reliable and the DMS8, in particular, has an excellent, in-service history and was obtained at a very attractive price. Coordination has been difficult and the recommendation to include the buildings and station installation work within the turn-key projects would have eased this problem.

C. Project Enhancements:

The Project Purpose is to support and strengthen ARENTO's ability to more efficiently manage and operate the telecommunications system. Enhancements recommended are: (1) In reference to authorized contract man months that are currently unassigned for ADLI: It is recommended that agreement be reached with ADLI to extend the 24 month period to encompass the remaining man months of effort. It is understood that Phase II of the ADLI contract covered a period of 24 months which will end on 1 February 1985, and that all 750 man months of effort will not have been expended. This extension will permit continued progress to be made in institutional programs such as Finance and

Administration, computer systems, planning, training, etc. which should benefit the Project Purpose. (2) ARENTO is concerned about their ability to do all of the station installations for the three Alexandria 1AESSs which will cut simultaneously. It is therefore recommended that consideration be given to extending the FACII contract to include station installation work utilizing NSPO or local contract personnel under FACII supervision.

D. Future Recommendations for Funding:

1) Utilization of Existing Funds:

Estimates indicate that between $11 and 23 million are available from the $242 million currently budgeted for AID Telecommunications Projects. A review of both AID recommendations and ARENTO requests indicate the following priority items should be included for use of available funds.

a) The provision of standby diesels for the nine X-Bar exchanges currently undergoing air conditioning replacement. It is understood that the commercial power at these exchanges is not completely reliable and has large voltage swings. The provision of standby power will ensure continuity and reliability of service and will extend the battery and equipment life.
b) Air conditioning replacement units for three X-Bar offices in Alexandria and the concurrent addition of stand-by diesels at these offices for the same reasons as for Cairo.
c) Switched Data Network for Egypt. There is an increasing demand for data transmission facilities in Egypt which should be provided by ARENTO to circumvent the users in providing their own facilities and depriving ARENTO of this needed revenue.
d) Subscriber Installation. It is imperative that the large investment in 1AESSs and associated outside plant be utilized for service as rapidly as possible to provide improved service and an earlier return on investment. If ARENTO can not keep up with the rate of new installed line capacity and is agreeable to accepting assistance, the use of a station installation contractor is appropriate, particularly in Alexandria where there is an acute shortage of ARENTO installation personnel. One option would be for FACII to subcontract with a local organization to do the station installation work under FACII's supervision and training.

2) Follow-on Priorities:

As discussed in II B above, the consultants favor AID follow-on financial assistance in support of ARENTO's anticipated telecommunications expansion program. The following projects are considered pertinent for AID financial assistance.

a) Additional 1AESS Exchanges: The project evaluation indicates that the highest return per AID telecommunication dollar will result from the highly visable service improvement afforded by the 1AESS and associated OSP projects and the junction relief program. The relatively low cost and short implementation schedule of the AID-financed switch and OSP projects has outstripped the European Consortium effort by an appreciable margin (Siemans

contract signed in October 1980 and only one EWSA has cutover to date), which should enhance the status of US suppliers in the eyes of ARENTO and the GOE. It is therefore felt that the addition of four to six new ESS exchanges will further enhance this stature. The exchanges having the highest priority from both ADLI and ARENTO are:

Pyramids West	20,000 lines
Demerdash	20,000 "
Eab El Khalik .	20,000 "
Nozha (Airport)	10,000 "
Dar El Salam	20,000 "
New Nasr City	20,000 "

These are all new exchanges and will undoubtedly require new building construction. In order to expedite this work, consideration should be given to extending existing equipment and OSP contracts if at all possible. Such action would shorten the period for firm allocation of funds and, based on the existing contracts, it is doubtful that the ATTI costs, in particular, could be bettered. Further, both contractors have now had serveral years of experience in the Cairo environment and would not have to go through the learning curve necessary for a new contractor. From ARENTO's standpoint, it is highly desireable not to introduce another type of switch into the network at this time with its unique spares, test equipment, additional training requirements. Further, the addition of 1AESSs will result in increased utilization of the existing CCA centers. Thus there is considerable merit in considering contract extensions for this follow-on work.

b) Switched Data Network: This project should have a high priority and, if not included in the utilization of Existing Funds above, it should be considered for Follow-on work.

c) Billing Unification: ARENTO badly needs a centralized computer billing system to assure accurate customer billing on a timely (monthly) basis. Such a system would increase ARENTO's cash flow and permit them to obtain additional revenues from many special customer featues that are available with the 1AESSs but are complicated to bill without a modern billing system. The centralized computer billing system could also be utilized for customer data retention and serve as a unified record for all customer data including service order generation and revenue input to the Accounting System on a daily basis. Such a large-scale computer could serve as the nucleous for future financial and management information systems which would allow ARENTO management to efficiently control the expanding telecommunications entity.

d) Expansion of Existing 1AESS Exchanges: ARENTO has requested further expansion of the Cairo and Alexandria (except Gleem) 1AESS exchanges. There is no question that customer pent-up demand would support additions to these exchanges. It is therefore recommended that these additions be provided as soon as ARENTO can demonstrate full utilization of the intial equipment.

e) Additional Institutional Programs and Procedures: As discussed in various sections of this report, there are other institutional type programs and procedures that are necessary to equip the ARENTO management to efficiently administer and control the expanding enterprise. Such things as a well organized provision of plant procedure to plan and control the construction

APPENDIX I THROUGH IX

APPENDIX I-A

Training Summary

A.D.Little International Incorporated Task A7

Course Title	Students Trained	Students Scheduled for Training
On The Job Training Instructional Techniques	10	
Training Course for Course Developers	4	
Seminar for Senior Management	54	
Future Managers Course'81	62	
Teaching Methods and Practices	8	
Introduction to Management Course	42 (1)	
Training Course for Course Developers	6	
Orientation for 5-yr Development Plan and Use of ITU's Trng. Dev. Guidelines	15	
Telecommunications Systems Course	10	
Cairo Exchange Managers Course	13	
Supervisory Course Instructors Training	11 (2)	
Future Managers Course'83	44	40-50 every 2yrs by ARENIC
Reading Skills Improvement Course	9	
Project Management Concepts Course	15	15 by ARENIC

(1) 22 trained in English by consultant; 20 in Arabic by ARENIC staff member

(2) These ARENIC instructors trained 215 Supervisors from Sept'83 to May 84

Training Summary
A.D.Little International Incorporated Task G5

Course Title	Students Trained	Students Scheduled for Training
1AESS Implementation Planning Factory Testing Installation Commissioning Operations and Maintenance Training	6	
Outside Plant Implementation Planning Design Construction Test & Acceptance	5	
Financial Management Systems Financial and Accounting Control Modern Concepts of Financial Mgt. Insight into Management Practices Computers	15	
Purchasing and Inventory Control	5	
Management Development Program	15	

APPENDIX I-B

Training Summary

American Telephone and Telegraph International

Course Title	Students Trained as of 1 July 84	Students Scheduled for Training
Technical English	96	
Refresher Math	96	
Basic Electronics	80	16
Fundamentals of ESS	80	16
Building Systems Engineers	6	
Documentation Center	4	
Building System Technician	55	
Local Test Desk	18	
Specs and Drawings	27	16
Fundamentals for the Tester	27	16
ESS Entry Level training	27	16
ESS Troubleshooting	27	16
IAESS Overview	27	16
Common Peripheral Units		16
Peripheral Unit Hardware		43
Peripheral Unit Hardware H.O		43
Introduction to IA Processor		43
Multilayer P.W. Board		43
IA Processor Hardware		43
IA System Operation		43
IA System Operation H.O		43
IA System Operations OJT	43	16

APPENDIX I-C

Training Summary

Ford Aerospace and Communications International

Course Title	Students Trained as of 1 July 84	Students Scheduled for Training
Outside Plant Planning Methods	10	
Outsiae Plant Engineering	15	15
Fiber Optics Terminal Equipment	19	
Underground Construction Methods	32	28
Cable Construction & Color Codes	36	24
Cable Placements	32	33
Cable Splicing	16	44
Serving Area Interfaces & DC1	25	27
Fiber Optics Installation Splicing	22	
Cable Fault Location	7	23
Outside Plant Acceptance Methods	8	20
Installation and Repair	32	40
OUT Station Installation	23	49

APPENDIX I-D

Sam P. Wallace Company Inc.
Air Conditioning system Training Course Outline

COURSE OUTLINE

A. Beginning Course
1. Basic Electricity
2. Refrigeration Controls Familiarization
3. Wiring Diagrams Interpretation
4. Ladder Schematic Diagrams Interpretation
5. Basic Refrigeration
6. Refrigeration Cycle Components
7. Refrigeration Specialists
8. Refrigeration Cycle Troubleshooting

B. Compressors
1. Theory
2. Types
   a. Description
   b. Operation
3. Analyzing failures, teardown and overhaul, reasons for failures, motor testing, lubrication systems, and capacity control methods.

C. Systems and Equipment
1. Piping
   a. Refrigeration
   b. Water

2. Pumps
   a. Types
   b. Operation
   c. Troubleshooting

3. Chilled and Cooling Water Flow
   a. Design - Type of Systems
   b. Troubleshooting

4. Liquid Chillers
   a. Types
   b. Operations of Metering Devices
   c. Troubleshooting

APPENDIX I-E

Alston Traffic Measurement Systems
Training Course Outline

A four week training program for six ARENTO engineers will be presented at the Alston training facility at Duarte, California.

Subjects

Theory of Operation	32 hours
Software Programming	24 hours
Fault Location	32 hours
Adjustment Procedures	16 hours
Equipment Maintenance Routine	16 hours
Extensive Hands-On Training, TMS	40 hours

APPENDIX II
Telecommunications I Project (No. 263-0054)
Project Completion Report

I. General:

The Evaluation Project Scope of Work requested a capsulized section on Telecommunications I Project (No. 263-0054) which would serve as a Project Completion Report. The original $40 million loan under Telecommunications I was subsequently augmented by two $80 million grants (Telecom II and Telecom III) and by a $42 million grant as an amendment to Telecom III. While the Project Paper from Telecom I identified descrete project activities, many of these were modified, and melded into the total Telecommunications Project. However, this appendix will attempt to identify those activities pertinent to Telecom I and will report on their completion or progress at this time.

Briefly, the project included approximately $7.5 million for assistance to ARENIC in planning, training, procurement, accounting - financial and personnel and in assistance to their Service Improvement Program (SIP). It also provided some $28.5 million for equipment, including the replacement of an obsolete rotary switch at Zamalek with a new model exchange. A contingency and escalation item of $4.0 million was also included. The items will be discussed in the following paragraphs.

II. Implementation:

A. Planning: Assist ARENIC to establish a planning unit. This item was subsequently modified to emphasize project management and control. As a result of this effort, a Project Planning and Management Office (PPMO) has been established in ARENIC and is equipped with a mini-computer to track the progress of turn-key projects as well as the budget status, loan commitments and contract expenditures. This item appears to be completed with continued monitoring by the consultant through the end of this year.

B. Training: Details of specific training were not included. Broadly speaking, the objective was to train a number of instructors in various curriculums to be determined by the consultant. Task A-7 was undertaken by ADLI to reinforce the management and technical training being carried out for ARENIC at the Technical Training and Research Center (TTRI). This task was accomplished during the period July 1980 to May 1982 and was completed with the exception of Management Instructor training in the US which was deleted by ARENIC and subsequently included in Telecom II.

C. Procurement: This item evolved into Task A-5, Purchasing and Inventory Control. ADLI has developed a stores catalog system for the mini-computer and is assisting in the development of a stores inventory system. The ADLI consultant is continuing to assist ARENIC in this project through the end of the year.

D. Accounting, Financial, Personnel: This item evolved into Task A-3, Financial Management System. Some success has been achieved but there is still considerable work to be done. The design and planning functions have been completed and made available to ARENTO where they have encountered some resistance to certain aspects such as; organization, chart of accounts, cash disbursements, budgets and auditing. Positive results have been obtained in payroll, a partial chart of accounts and billing. Effort on Telecom I is essentially complete as far as ARENTO will permit.

E. Service Improvement Plan (SIP): The ADLI/CPCI SIP tasks were designated as B-1 through B-9 with 357 manmonths of effort allocated. Most of these tasks were completed by May 1982 with at least three of the tasks being extended into subsequent Telecom projects. The major SIP effort was the replacement of air conditioning in nine X-Bar exchange and the addition of Traffic Measuring Systems at the Opera Exchange. Both of these projects are progressing well with AC installations well underway at Abbassia and Pyramid exchanges and all are scheduled to complete on or ahead of schedule. The Opera TMS equipment has cleared customs and installation is proceeding for completion about the end of this year.

F. Equipment: This item included the preparation of specifications, an IFB, evaluation assistance and the implementation of a model exchange at Zamalek to replace the obsolete rotary exchange at that location. This work was completed with the cutover of a 20,000 line 1AESS switch and outside plant on 24 May, 1984. Other equipment included in this item, such as an Airport PBX and microwave system and mobile switches, were deleted in subsequent phases and supplemented in Telecom II and III with seven more 1AESSs to replace all rotary switches in Cairo and Alexandria. In fact, the Zamalek exchange was incorporated into an overall IFB and the resulting contract for eight 1AESSs and outside plant for six exchanges.

III. Conclusions:

Recommendations for final adjustments in project design, post-project AID monitoring and evaluations remaining to be undertaken do not appear to be applicable in this case due to the continuing nature of the projects under Telecom II and III. Further, a summary of lessons learned is included in the overall project evaluation report and applies to Telecom I, II and III.

Overall speaking, it would appear that the Telecom 1 project was executed in accordance with the original Project Paper as subsequently modified and that the resulting effort contributed substantially to meeting the original Project Purpose.

APPENDIX III

CPCI Operations/Maintenance Accomplishments and Recommendations

A. Examples of O & M Accomplishments:

- o After discovering that cable pressurization equipment had been purchased but not installed at some time in the past, the consultant arranged to have the equipment installed on the paper-insulated cables and the cables repaired in order to maintain pressure. This was a major undertaking. The system exposes leaks in cable jackets and splice closures. When these are repaired it results in a significantly more reliable cable plant.

- o To improve the condition of the crossbar equipment the consultant organized switch adjustment classes and had them presented in Cairo and Alexandria with the cooperation of the ARENTO training center personnel.

- o Through a feeder cable testing program, 8000 additional useable cable pairs were located in Cairo.

- o Equipment troubles on junction plant equipment were reduced by reorganizing the maintenance procedures.

- o Training courses have been prepared but not yet presented to teach customer trouble report administration using the Fault Reporting System.

These examples are representative of the diverse types of problem areas in maintenance and operations that are being addressed and improved by the consultants. There are many more accomplishments that have improved service but the magnitude of the problems is so great that a four-man team is totally inadequate to make all of the changes required.

APPENDIX IV

Recommendations to Improve Operations and Maintenance

I. Installation and Repair of Telephone Service Wire and Instruments.

The connection between the outside plant cable and the subscribers telephone is being made by the ARENTO O&M personnel and it is not being adequately done. The Ford (FACII) contract provides for 1000 connections to be made under FACII supervision in each new ESS exchange area. These are being adequately installed. It was reported that 2/3 of those installed for the Zamalek exchange cutover did not function properly. Many telephones could call out but could not receive incoming calls. This normally is caused by incorrect records of the cross connects made to establish the electrical connection between the telephone and the switch. There are 3 places in the system where connections are made for each telephone and an error in record keeping at any one of them will cause the problem of the telephone not being connected to the proper number in the exchange equipment.

It is recommended that a contract be awarded to provided a technician for each central office of 10,000 lines or more to work with the installation and repair forces and bring about the use of proper installation methods and proper record keeping. His assistance should also cover repair of stations that are out of service.

II. Exchange Switching Equipment:

The new electronic switching systems can be expected to cause little trouble during the periods when they are operated by the suppliers personnel and ARENTO personnel trained by the supplier. The attitudes and skills developed by these ARENTO personnel should continue to keep these new electronic systems working adequately after the maintenance contracts end.

The major switching equipment maintenance problem is in the crossbar exchanges. These are being allowed to deteriorate due to inadequate routine maintenance. The newly installed crossbar exchanges are reported to have initial troubles that can be cleared with normal maintenance procedures. The one switching equipment consultant funded by USAID has had good results in teaching the ARENTO personnel to perform the maintenance procedures and then supervising the implementation of the procedures.

The problem of upgrading the performance of the crossbar exchanges can be solved by adding additional consultant technicians to work in these offices. The design of the crossbar system is adequate and they can remain in service for 20 years and give good voice grade telephone service. They are worth maintaining rather than replacing.

It is recommended that a contract be awarded to provide a crossbar technician in each crossbar exchange of 10,000 lines or more to assist ARENTO with the maintenance of this equipment. The contract should also provide for the development and documentation of standard maintenance procedures. ARENTO should participate in the development and approve the final product for use.

III. Outside Plant

It is recommended that a contract be awarded to provide at least 10 outside plant technicians so each Zone Sector and the Cairo Junction Cable Department will have one or more technician to assist ARENTO to maintain the outside plant. The purpose of these technicians and consultants is to assist ARENTO in developing the supporting institutions and administrative procedures that are normal to an operating telephone organization working to industry accepted standards. The ARENTO upper and middle level management personnel are aware of what must be done but they need the support of technical personnel dispersed throughout the organization to train and supervise the operations and maintenance personnel in developing and using proper techniques. This type of training is best conducted on-the-job by working technicians where the results can be seen in better performance of the plant. The teaching of attitudes and work habits is as important in these areas as is the technical instruction.

IV. Test Equipment

Funds are not available and no standard system exists for having test equipment repaired. Some of the test equipment would be repaired at no cost to ARENTO because it is still under warrenty when it breaks down. Test equipment is vital but it is also relatively fragile. It can be expected to break down and require repairs. A system and adequate funds should be made available for accomplishing this on a regular basis.

V. Utility Coordinating Committee:

A utility coordinating committee should be established to stop the damage being done to the other utilities plant by the water authority, electric power authority, sewer authority and ARENTO. These groups cause many plant troubles for each other and do not report them. A coordinating committee could inform each member what work is scheduled and steps could taken to limit plant damage. This type of coordination is made easier if accurate plant records exist and if work schedules are published well in advance.

VI. Records:

Outside plant and central office equipment records are necessary to efficiently maintain and operate the plant. The ARENTO records have not been adequately updated as changes take place. This is one of the benefits that could be gained from a Work Order Procedure, an engineering and administrative system that specifies and authorizes all plant additions, changes and removals. The time to start such a system is when a major expansion and replacement program takes place. The new plant records can be produced as a by-product of the construction program. The existing records are self-purging as the old equipment is replaced.

VII. Building Industry Representatives:

It is recommended that ARENTO establish a group of trained engineers to interface with the building industry to introduce building features which would make the provision of telephone and data services more efficient and practical in new commercial buildings. Architects and owners need to be convinced that providing cable risers, equipment closets, underfloor ducting, frame rooms and PABX rooms is to the mutual benefit of everyone concerned. These features should be included in the design when the building is planned.

VIII. Procedural Changes:

There are several areas where changes in organizational procedures would make operations and maintenance more effective. It is recommended that a consultant be provided to work for the Vice Chairman Operations and Maintenance to develop solutions for these problems:

- o New equipment installations such as the Maadi exchange are not turned over to the Operation and Maintenance Department when it is put in service. The Projects Planning Department accepts the new plant from the organization that constructs it and operates it with Projects Planning Department personnel until it is turned over to O & M for operations at a later date. This date might be as long as 2 years after the plant is in operation. This situation is unusual in that two separate groups of personnel must be trained to operate and maintain the same type of equipment. Those who gain the early experience, such as the ARENTO technicians working with the NTTI personnel in the 1A ESS exchanges, are moved out and replaced with personnel from the O & M Department when the equipment is released by the Project Planning Department. O & M personnel should be integrated into the system prior to acceptance and remain on the job thereafter.

- o Purchasing and Stores is under the Economics, Finance and Administrative Affairs Department. The system for controlling and issuing spare parts is unwieldy and adversly effects operations and maintenance. The same equipment part may be listed under several stock numbers so that the record shows that no repair parts are available while actually there may be many in stock under a different number. Approval to issue from stock requires approval from a very high authority level thereby introducing a significant delay. The end result of these problems is that parts are not readily available to make repairs. It is recommended that purchasing and stores be moved to the Operations and Maintenance Department.

No adequate or uniform system of results reporting exist. The new equipment being installed is capable of producing many of these condition reports automatically and the reports are gaining acceptance. A system should be developed which would cause the C & M personnel to test and measure various plant conditions in the crossbar offices on a regular basis and submit consolidated reports to the various levels of AREMO management. This would tell the managers which plant is acceptable and which is not. They could then take action to have the unacceptable plant repaired or adjusted as required.

APPENDIX V

Summary of Maintenance and Operations and Training Recommendations Requiring Funding

1. Mini-computer for each major exchange for the Fault Reporting System.
2. Test equipment and repair parts for installed test desks in crossbar offices.
3. Funds for repair of existing and future test equipment.
4. Hand tools for each station installer and replacement program for these tools.
5. Replace all defective service wire installations.
6. Halon gas fire extinguishing systems in LAESS offices.
7. Responsibility to install and repair service wire to be included in cable O&M contract.
8. Electrostatic particle precipitator for airconditioners.
9. Water treatment addition to airconditioning system.
10. Four consultants for training center with maintenance funds.
11. Several small busses with a maintenance contract for the training center.
12. Five additional model classrooms at training center.
13. Actual communications equipment and test equipment for training use at training center.
14. Station Installation and repair consultant for each exchange of 10,000 lines or more.
15. Crossbar technician for each crossbar exchange of 10,000 lines or more.
16. Ten outside plant technicians to work with ARENTO outside plant maintenance and operations forces.

APPENDIX VI

Overall Efficiency of Telecommunications in Egypt Effect of Telecommunications Project:

Background:

The Sector Study Executive Summary states (on page 1-69) that "Based on tests made by ARENTO in March 1978, only 23.9% of the calls placed in the Cairo Area were completed succesfully. In the Alexandria area the results were 55%. Since the calculation of completion rates includes busys and don't answers, a good grade of service is considered to be in the mid to high 70% range. It is reasonable to expect that due to inadequate maintenance, further deterioration in call completion rates have occurred between March 1978 and December 1983 when the first 1AESS was placed in service.

Effect of Telecommunications Project:

The Telecommunications Project will have a major impact on the call completion rate in Cairo and Alexandria due to:

- The replacement of eight obsolete rotary exchanges with new 1AESS exchanges.
- The provision of a COM center in Cairo and Alexandria which has the ability to test through the junction network and identify problems in connecting plant and exchanges.
- The addition of fiber optic and voice frequency cables to increase the junction network circuits in Cairo and Alexandria.
- The Operation and Maintenance program to improve the maintenance of the crossbar offices including the air conditioning replacement at nine crossbar offices in Cairo.
- The increased level of training of ARENTO operations and maintenance people.

Once the number assignment and station installations in the new 1AESS exchanges are correctly made, the call completion rates within these exchanges will be equal to those experienced any place in the world. And at the completion of the junction network, towards the end of 1985, call completion between all electronic exchanges (including the EWSAs) will be equally good. The remaining problems will be with the existing crossbar offices. The improved maintenance and reductions in call attempts due to greater junction circuit availability in these offices will also result in improvement in call completions where a crossbar office is involved.

The Maadi exchange is the only USAID financed replacement that has been in service long enough for the recorded trouble statistics to show significant trends. The installed monitoring equipment in each 1AESS records internal and external problems that prevent call completion. It is a very useful tool for identifying problems in the telephone system.

The improved call completion assumptions made above are based, in part, on several months of recorded statistics available from Maadi which reveal the following:

- o The problems within the 1AESS switch drop to an insignificant number soon after cutover.

- o The number of lost calls due to outside plant troubles within the Maadi distribution plant were reduced from 13% to 6% of the total between April and May. This indicates that the assignment record problem is being reduced in Maadi.

- o Approximately 75% of the lost calls are attributable to congestion in junction plant and in the other offices being called by the Maadi subscribers.

The largest fault component, "congestion", will be greatly relieved by the fiber optic junction network that it being installed. The quantity of circuits that will be available will negate even the allowable amount of trunk-busy conditions for several years of system growth. The worst exchanges in the system are being replaced by 1AESS which will be as trouble free as the Maadi exchange. These two actions will reduce the failures due to congestion to a much smaller number.

Removing the congestion problems by replacing the rotary exchanges will improve the performance of the existing crossbar exchanges by reducing the call load presented to them. Much of the present load is made up of non-productive attempts to place a call whose completion is prevented by faulty plant in another exchange or insufficient circuits between exchanges. The residual problems in the crossbar exchanges can be identified and removed by an aggressive maintenance program.

The telephone plant provided by the USAID Telecommunications Project will give Egypt the capability to have a first class telephone system with an acceptable completion rate. Improved maintenance and operation by ARENTO is absolutely essential to the continued attainment of this improved completion rate.

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APPENDIX VII

Tariff Status Review

At present Egypt has slightly over 500 thousand telephones of which 70 percent are classified as residential. Revenues from residential customers for subscriptions, installations, excess calls and within-Egypt calls amounted to about 15 percent of total ARENTO revenues in fiscal year 1982, under the old rates. The new rate schedule put in effect in January 1982 contained no increases for residential subscriptions or excess calls, a small increase for within-Egypt calls and a sharp increase in installation charges. Business and government charges for a wide range of services were increased substantially under the new tariff schedule. As a result, the share of revenues from residential customers declined to an estimated 12 percent in FY 1983. Overall the new tariffs were to raise an estimated 67 million LE in FY 83 from domestic telephone and telex charges. Actual figures for that year suggest that about 60 million LE were raised in FY 83, an increase of 35 percent over FY 82.

While domestic revenues increased less than expected under the new tariff schedule, international revenues were more than double those expected in the project paper; 103 million LE in FY 83 versus the 46 million LE projected. International revenues are determined by the volume of calls and a rate structure agreed upon internationally. While these revenues would be much more difficult to estimate than domestic revenues, it should be noted that the international revenue share is considerably higher than that expected in the project plan: 40 percent was expected for 1983 and the actual share was 63 percent.

Two conclusions may be drawn from these data: 1) The great bulk of phone customers in Egypt experienced no increases in phone charges and 2) revenues from international calls, telexes and telegraphs contributed heavily to the significant increase in ARENTO revenues in the most recent fiscal year. Since international revenues are a much more important source of revenue than expected when the project was formulated, they deserve closer examination to determine their potential growth, volatility and future impact on ARENTO earnings.

The GOE and ARENTO covenanted to propose a tariff rate structure for 1980-85. New rates for a limited portion of ARENTO customers were put in place in Jan. 1982 but, as yet, there is no structure for future rate increases. Basic charges for residential customers appear likely to remain unchanged in the forseeable future, except for a possible new charge based on the time per call, which would have the desirable effect of charging residential customers more for lengthy local calls. In general, future revenue increases will be influenced by the volume and rate of international calls, which ARENTO can influence only marginally, and heavier tariffs on the relatively narrow customer base of business and government (which often does not pay its bill), plus surcharges for new installations. A broader revenue base would be more desirable, economically and financially.

APPENDIX VIII

Preliminary Financial Cost/Benefit Analysis - Follow on Activity

I. General:

Section VI D of the evaluation report recommends the addition of a number of new ESS exchanges in Cairo as AID-financed follow-on projects. This preliminary cost/benefit analysis indicates the viability of such an undertaking which is the major item recommended.

II. Estimated First Costs:

		First Cost In Millions
Six additional electronic exchanges		
110,000 lines of 1AESS @ $400/line	=	$44.0
200,000 lines of distribution cable including station installation @ $350/line	=	70.0
Six new Buildings @ $3M/bldg.	=	18.0
25,000 Junctions @ $500/termination	=	12.5
Total First Cost		$144.5

III. Estimated Annual Charges:

Straight-line depreciation - 20 years	5%
Maintenance	10%
Administration and Overhead	5%
Cost of money	8%
Annual charge	28%

$144.5 M @ 28% = $40.5 M/year

Assume 110,000 lines at 95% fill = 104,500 lines

Annual charge per line = $40.5 M/104,500 = $387/line

It is reasonable to expect that additional subscribers will generate additional national and international toll revenues and therefore, a part of this annual charge should be applied as a cost to toll generation. In this simplified study, 30% of the annual cost per line is considered as a toll cost. Therefore, the annual cost per line applicable to the local exchange will be $271, or approximately $22.50 per month in the year 1987.

IV Conclusion:

The Economic Analysis in the Project Paper Amendment dated May 1982 states that the cost per telephone in countries comparable to Egypt is $225 per line (from AT&T Publication - World Telephons 1980). It is further stated that this rate level appears to be reasonable for Egypt, once telephone service has been improved. A $225 annual charge in 1980 is equivalent to $294 in 1987, based on a conservative inflation rate of 4% a year. Thus the $271 annual cost per line developed above would allow a profit margin of approximately 9% based on the attainment of the $296 annual telephone charge (average for both business and residential).

A similar analysis of providing 72,000 additional lines in the existing 1AESSs results in an incremental annual cost per added line of approximately $85 since most of the distribution cable, common switching equipment, building space and junction circuits were included in the original Telecom Projects.

AGENCY FOR INTERNATIONAL DEVELOPMENT APPENDIX IX

1. Country of Performance: Egypt

Mark one and insert appropriate numbers:

X Indefinite Quantity Contract: OTR-0000-I-00-4142-03 Work Order No. 3
__ Requirements Contract No.: _____ Delivery Order No. ___
__ Basic Ordering Agreement No.: _____ Task Order No. ___

NEGOTIATED PURSUANT TO THE FOREIGN ASSISTANCE ACT OF 1961, AS AMENDED, AND EXECUTIVE ORDER 11223

CONTRACTOR (Name and Address):	4. CONTRACTING OFFICE (Name and Address):
Teleconsult, Inc. 2555 M Street, N.W. Washington, D.C. 20037 DUNS #06-112-7536	Regional Operations Division/NE Office of Contract Management Agency for International Development Washington, D.C. 20523
PROJECT MANAGER AND PROJECT OFFICE (Name and Address):	6. SUBMIT VOUCHERS TO (Office Name and Address):
Al Hotvedt NE/PD/ENGR Agency for International Development Washington, D.C. 20523	Controller USAID/Cairo American Embassy Box 10 FPO New York 09527
EFFECTIVE DATE:	8. ESTIMATED COMPLETION DATE:
See Block 11b below	27 June 1984

ACCOUNTING AND APPROPRIATION DATA (Insert appropriate numbers):

Amount Obligated: _____ PIO/T No.: 263-0117-3-00506

Appropriation No.: 72-11M1037 Budget Plan Code: MESA-80-23263-KG18

The United States of America, represented by the Contracting Officer signing this Order, and the Contractor agreed that: (a) this Order is issued pursuant to the Contract or Agreement specified in Block 2 above and (b) the entire contract between the parties hereto consist of this Order and the Contract or Agreement specified in Block 2 above.

NAME OF CONTRACTOR:	11b. UNITED STATES OF AMERICA AGENCY FOR INTERNATIONAL DEVELOPMENT
Teleconsult Inc.	
(Signature of authorized individual):	BY (Signature of Contracting Officer):
R L Brown	Kathryn Y. Cunningham
TYPED OR PRINTED NAME:	TYPED OR PRINTED NAME:
R. L. Brown	
Project Manager	TITLE: Contracting Officer
5/11/84	DATE: 11 May 1984

FORM (6/83)

ARTICLE I - TITLE

Evaluation of Telecommunications Projects
(Project Nos. 263-0054, 263-0075, 263-0117

ARTICLE II - OBJECTIVE

To perform a mid-project evaluation to assess the progress and impact to date of a three-tranche telecommunications project now being implemented, in Egypt by the Arab Republic of Egypt National Telecommunications Organization (ARENTO) and to determine the need for additional assistance.

ARTICLE III - STATEMENT OF WORK

The overall evaluation scope of work shall be:

1. Evaluate and document progress to date on major contracts, institutional development efforts, and other inputs set forth in project documents. Relate findings to proposed Project outputs.

2. Evaluate and document ARENTO performance in required Project covenant actions. Specifically discuss the adequacy of ARENTO's tariffs, and operations and maintenance budgets and program.

3. Assess progress to date in achieving outputs and their continued relevance in achieving the Project purpose. Will the end of Project status as presented in Log-Frame be achieved? When? Re-examine continuing validity of assumptions as stated in Logical Framework column 4 at goal, purpose and output levels.

4. If appropriate, recommend ways in which achievement of the purpose can be enhanced during the remaining life of the Projects. Make specific recommendations for corrective action or appropriate follow-on activities relative to selected institutional development areas. Prepare a cost benefit analysis of ongoing and proposed Project activity.

5. Identify the Project's major beneficiaries, direct and indirect.

6. Where appropriate, discuss non-project factors that influence the Project (e.g., government policies), and unplanned or indirect Project impacts such as change in investment climate for private sector.

7. Document the extent to which these Projects are affecting the overall efficiency of telecommunications in Egypt and the extent to which efficiency can be expected to improve by the end of the current Projects. In the context of findings under points 1 through 4 above, assess the financial, technical and institutional capacity of ARENTO and the appropriateness of an AID-financed major follow-on capital expansion program.

8. Prepare a Project Evaluation Report based on the above scope of work and also summarizing individual team member findings. This report should also include a special section on lessons learned that will be applied in any follow-on efforts or that other A.I.D. Missions might consider in similar projects.

9. Include a one or two page Executive Summary of the Project impact on telecommunications in Egypt for the non-technical reader.

The team member qualifications and assignments shall be as follows:

I. Team Leader:

A. Primary Qualifications:

Extensive project or industry management experience with major utility/capital projects, including both technical and administrative responsibilities; at least basic knowledge of A.I.D. organization or regulations; and ability to write well. Prior experience in telecommunications and work experience in the Middle East are also desirable.

B. Scope of Work:

1. Evaluate the overall Telecommunications Project's design, and the adherence to date of the Project to the Project design, including a review of the progress toward achieving the LOGFRAME purposes and schedules as originally planned.

2. Study changes made in ARENTO organization and processes. Assess the current Project organization, management and structure, including ARENTO, contractor and USAID interrelations. Make recommendations as appropriate now and for possible follow-on activities.

3. Evaluate major Project contracts with respect to cost reasonableness, bidder selection, soundness of contracts, etc.

4. Review and evaluate the initial telecommunications system performance measurements and recommend additions or changes as appropriate.

5. Specifically review Task A-2 of A. D. Little (ADLI) Contract, "Project and Program Management Office", and Task A-6, "Fundamental Planning." Assess Task progress to date and recommend future actions.

6. Working with material provided by the team members, prepare the evaluation report, including all points set forth in the overall scope of work, and recommendations as additional telecommunications funding, funding level and project design. Also include a capsulized section on the Telecommunications I Project (No. 263-0054), which will serve as a Project Completion Report.

II. Financial Analyst/Computer Systems Team Member:

A. Primary qualifications - Very experienced financial analyst/CPA with substantial computer systems experience; preferable several years experience with a major utility organization; experience with accounting systems design. Secondary qualifications - Work experience in the Middle East; cost/benefit analysis skills.

B. Scope of Work

1. Assess progress to date on the ADLI Task A-3, Finance and Accounting Work. Propose the next reasonable steps in payroll computerization to lead to a computerized personnel management system. Recommend general scope of work for follow-on activity, including long-range financial planning and appropriate accounting system changes.

2. Assess final ADLI Task A-4 billing program and proposed computerization of all billing systems. Estimate financial impact of ARENTO proposed billing system improvements.

3. Looking at various computerized sections now in ARENTO, recommend the next steps advisable to upgrade ARENTO computer skills and usage.

Items 4, 5, 6, and 7 shall be done in cooperation with the USAID team economist:

4. Review current tariff structure of ARENTO. Assess adequacy of recent tariff increases and ARENTO performance relative to Project covenants on tariffs.

5. Summarize the financial condition of ARENTO, and evaluate progress on Project financial covenants. Recommend priority financial management actions that should be undertaken in the near future.

6. Enumerate and quantify expected benefits of current project activity, especially focusing on the impact on private investment climate. Prepare a cost/benefit analysis for the Project, and relate finding to original Project Paper analysis. Also prepare a preliminary cost/benefit analysis of any follow-on activity recommended by the team.

7. Address the use of donor funds for system expansion needs and re-grant versus re-loan funding and suitable interest rates and terms.

III. Training and Personnel Team Member

A. Primary Qualifications - Minimum ten years experience in technical training and/or personnel management in private industry or major utility. Also desirable but not mandatory - Work experience in the Middle East; telecommunications work experience.

B. Scope of Work

1. Prepare a summary chart of all ARENTO personnel trained or to be trained under the Telecommunications Projects.

2. Assess training activities under each of the following contracts: ADLI, A T and T Int'l., Ford Aerospace, Traffic Measuring Systems, and Air Conditioning. Evaluate the degree to which ARENTO post-training assignments take into account newly acquired skills. Recommend future actions.

3. Assess general activities at the ARENTO Technical Training and Research Institute (TTRI) and propose an action plan to upgrade this Institute to better serve ARENTO.

4. Assist the team leader in the general task of institutional development evaluation, specifically focussing on changes proposed, made and most needed in ARENTO organization and processes.

ARTICLE IV - REPORTS

Prior to departure from Egypt the Teleconsult Team shall submit the final report in ten copies to the USAID Project Manager, Gorden West, DRPS/IDPS. Three copies shall also be submitted to the AID/W Project Officer, Alfred Hotvedt, NE/PD/ENGR.

ARTICLE V - RELATIONSHIPS AND RESPONSIBILITIES

During their performance in Egypt, the Teleconsult Team will be responsible to the USAID Project Manager, Gorden West, DRPS/IDPS and will work in cooperation and coordination with the Egyptian implementing agency, ARENTO.

ARTICLE VI - TERM OF PERFORMANCE

The desired starting date is 13 May 1984 and the estimated completion date is 27 June 1984.

Subject to the prior written approval of the Project Manager (see Block No. 5 on Cover Page), contractor is authorized to extend the estimated completion date provided that such extension does not cause the elapsed time for completion of the work, including the furnishing of all deliverables, to extend beyond 30 calendar days from the original estimated completion date. Contractor shall attach a copy of the Project Manager's approval for any extension of the term of this order to the final voucher submitted for payment.

It is the contractor's responsibility to ensure that Project Manager-approved adjustments to the original estimated completion date do not result in costs to the Government which exceed the total amount obligated for the performance of the work. Under no circumstances shall such adjustments authorize the contractor to be paid any sum in excess of the total amount obligated in this order for the performance of the work.

Adjustments which will cause the elapsed time for completion of the work to exceed 30 calendar days beyond the original estimated completion date must be approved in advance by the Contracting Officer.