

PD-ABM-740



CONSTRUCTION MANAGEMENT CONSULTING CONTRACT

In Support of Telecommunications IV

USAID Contract Number
263-0177-C-00-2216-00

FINAL JOB REPORT

Overseas Bechtel, Incorporated - Job 22083
and its subcontractor Teleconsult, Inc.
World Trade Center, 18th Floor
Cairo, Beaulac, Egypt



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USAID-EGYPT TELECOMS IV EXPANSION PROJECT

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I EXECUTIVE SUMMARY

Introduction

This is the Final Report for the USAID-Egypt Telecommunications IV Expansion Program (USAID Contract No. 263-0177-C-00-2216-00). Under this Construction Management Consulting Services (CMC) Contract, Overseas Bechtel, Incorporated managed telephone upgrades from October, 1992 through December, 1995 using host country contracts. Two contracts were issued by the Arab Republic of Egypt National Telephone Organization (ARENTO), Contract 10/92/21 for Digital Switching Systems (DSS) and Contract 7/92/30 for Outside Plant (OSP).

Section I, Executive Summary, contains Project background and a discussion of achievements and recommendations. The Project Summary Schedule shows the completion of major milestones. The highlights in Section I were summarized from contributions made by ARENTO Management, Host Country Contractors and the CMC.

Section II, Project Scope and History, outlines the work scope, schedule milestones, and progress for the DSS and OSP contracts.

Section III contains selected progress photographs depicting installation, testing and acceptance of the #5ESS switches, COM System and Outside Plant Network.

Section IV, Appendix A, contains a DSS Report with technical observations and recommendations. The information was prepared by Teleconsult, Inc. to provide system analyses and suggestions for improving network operations.

Section IV, Appendix B, contains a summary report of Outside Plant activities required during the maintenance and guarantee period. This information was extracted from ARENTO Contract 7/92/30, Amendment No. 5. Amendment No. 5 contains the final Bill of Quantities (as-built) and a description of final acceptance requirements for contract close-out.

I EXECUTIVE SUMMARY

Summary Description of Project

The United States Agency for International Development (USAID) is assisting the Government of Egypt with the expansion of the Cairo telecommunications network under USAID Project No. 263-0177, Telecommunications IV. The total program commitment for the Telecoms IV Expansion was \$42 million.

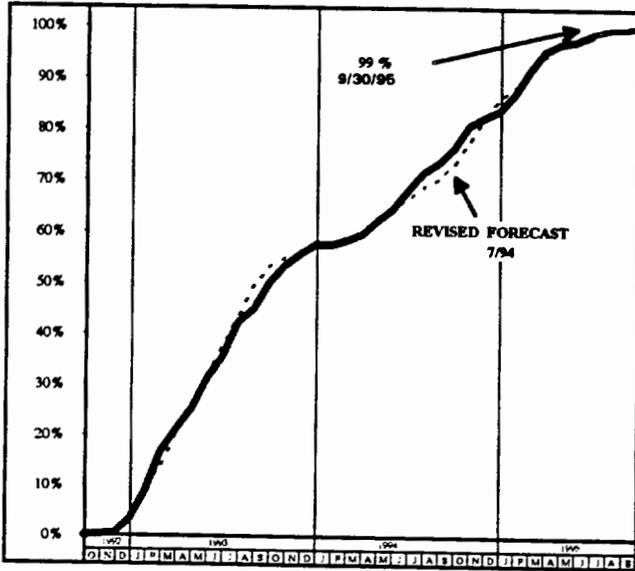
Overseas Bechtel, Incorporated (OBI or Bechtel) was contracted with USAID-Egypt to provide construction management and consulting services to the Arab Republic of Egypt National Telecommunications Organization (ARENTO). Bechtel and its subcontractor, Teleconsult, provided technical advice, support and assistance to ARENTO in the administration of two turnkey contracts that replaced and expanded central office switching equipment with Digital Switching Systems (DSS), added a Centralized Operations and Management (COM) system and expanded the Outside Plant (OSP) network.

Telecommunications IV successfully added:

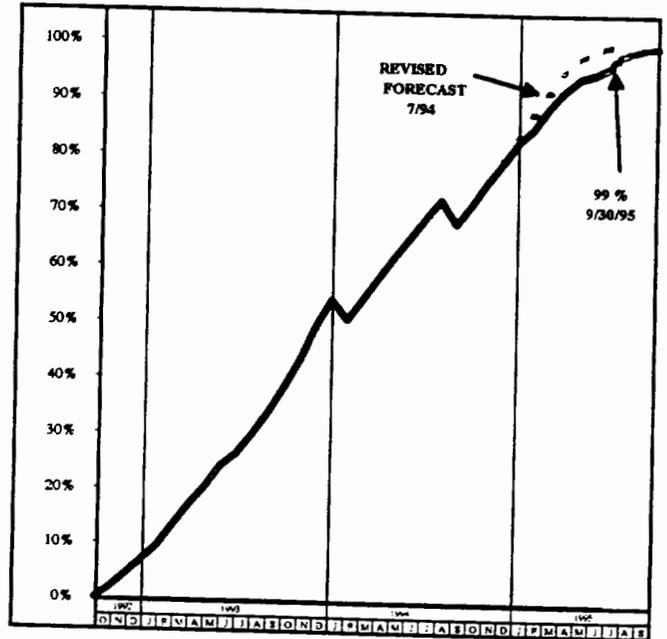
- Four new 20,000 line AT&T #5ESS digital switching systems located in existing ARENTO central office facilities at the Ramsis, Opera, Pyramids and Giza exchanges.
- A Centralized Operations and Maintenance (COM) System to monitor and control the network switching nodes. The CMC provided supplemental training, commissioning support and assistance with the development of operating procedures.
- Outside plant network upgrades at the Heliopolis, Giza and Auto exchange areas which added 73,200 new subscriber lines. The CMC and Contractor helped develop ARENTO Maintenance Teams by providing supplemental on-the-job training and dedicated maintenance test equipment at the three exchanges.
- After acceptance of the initial installation, a major addition at Giza increasing the #5ESS switching capacity by 19,000 lines.

I EXECUTIVE SUMMARY

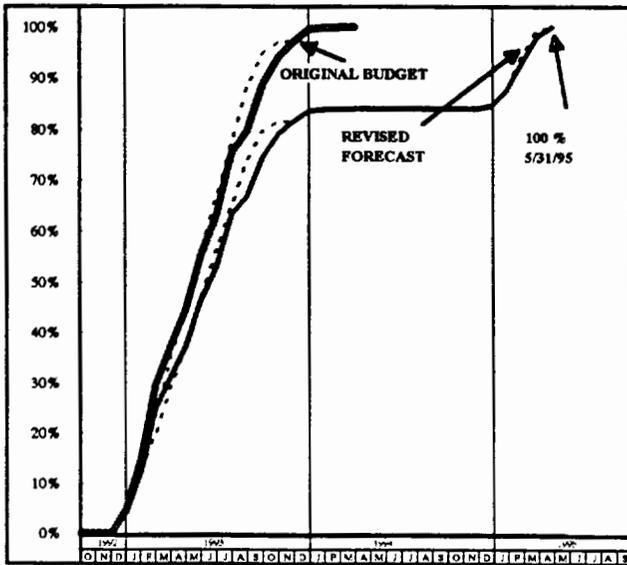
Summary Curves



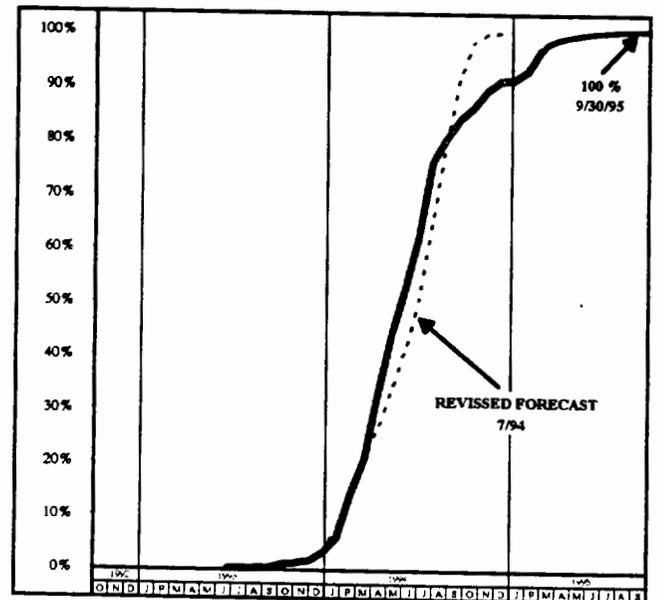
Total Project



Consulting Services



Digital Switching



Outside Plant

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I EXECUTIVE SUMMARY

Achievements and Recommendations

Overseas Bechtel, Incorporated and its subcontractor Teleconsult, Inc. provided Construction Management Consulting Services, working with ARENTO, to manage the Telecommunications IV Expansion Program. Management comments are summarized to provide constructive suggestions that can be used to improve project execution processes. The lessons learned were reviewed with ARENTO, USAID and contractor representatives.

Throughout the Project, a concentrated effort was made to achieve three primary goals:

1. To prepare coordinated implementation plans and schedules, then complete the works in a timely manner.
2. To administer the contracts fairly, assuring compliance with the terms, conditions and technical specifications.
3. To ensure quality workmanship and continuous improvement by supporting training and development programs for ARENTO and Host Country Field Engineers.

It was apparent that the combined efforts of USAID, ARENTO, Consultants and Contractors are improving ARENTO's business practices. Inexperience in program/project management was largely overcome during the Telecom IV Expansion, which is the continuation of a historical relationship between USAID and ARENTO. This report reviews project performance and formulates recommendations concerning work practices.

Clearly, the USAID investments of time and money have made a difference. The cooperative working environment was the project's greatest asset in dealing with complex operational and technical issues. The commitment of ARENTO's Vice Chairman, General Managers and Sector Chiefs to "project management" facilitated improvements in scheduling, contracting and overall work quality.

The on-going transition from USAID funded telecommunications switching and outside plant projects to large self-financed network wide expansions is in progress. This change needs to be encouraged in such a way that the newly learned management skills continue to be used and improved. Accelerating the rate of telephone network expansion is important for Egypt to meet industrialization goals and prosper. ARENTO recognizes the need to grow "CMC" skills and capabilities to manage projects. To complete the transition to self-sufficiency ARENTO's business practices must change to incorporate the best tools and proven work methods adopted for USAID projects. The USAID-ARENTO partnership should continue to support development of improved business practices. Key training areas are long range planning, human resources, capital project financing, and network management technology.

I EXECUTIVE SUMMARY

Achievements and Recommendations

Comments have been organized by management the categories of Planning, Organizing and Staffing, Contract Administration, Quality and Safety, and Training. Important activities are included as check lists for reference.

PLANNING

Contractors Manual - Separate Contractor's Manuals were developed for the Digital Switching and Outside Plant contracts. The Manuals, developed at project inception, established organizational and administrative procedures to implement the contract. The process of coordinating the procedures gained ARENTO and contractor commitment, improving the understanding of terms, conditions, and reaching understandings on how the contracts would function. The administrative procedures and forms contained in the Contractor's Manuals were updated during the project and subsequential adapted for use on the TSS Project. This effort helped provide a consistent project approach.

Responsibility Matrix - The roles of the Project Team were summarized on organization charts and established in the responsibility matrix contained in Contractor's Manuals. Organizational issues of responsibility and authority were reviewed at the Construction Kickoff Meeting. The organization charts and matrixes were updated regularly to clarify the functional roles for ARENTO, Consultant and Contractor.

Project Implementation Plans - Guidelines for the preparation of the project execution plan and specific plans for documentation, quality, testing, etc. were agreed upon to coordinate planning and task execution. Project plans must focus assigning areas of project responsibility and coordinating the interfaces between the participating team members. Currently the CMC functions as ARENTO's agent to conduct meetings, share information and interface between ARENTO and the Contractor and between the ARENTO departments.

Mobilization Schedule - A contract mobilization schedule was developed specifically to monitor and track contractual milestones for deliverable items. The contractor's efforts were reviewed on a summary schedule that was updated for the Monthly Progress Meeting. Although milestone dates tended to slip, the mobilization schedule was viewed as a valuable tool to focus work efforts on contractual items.

DSS Planning - Current DSS practices for project implementation and O&M are workable. Areas which can be improved are:

- On-time planning and execution of facilities work (building refurbishment, power and water systems, etc.) performed by public sector contractors or ARENTO's shop

I EXECUTIVE SUMMARY

Achievements and Recommendations

- Effective cutover planning (prioritized line lists, trunking requirements, customer coordination, a significant number of line transfers at cutover) executed by a joint team of ARENTO's selected by the Project and Zone managers
- Greater use of the available traffic and network capabilities of the COM System.

OSP Planning - Outside Plant civil activities for duct banks and manholes have long construction lead-times. These activities should be accelerated in the planning phase to enable the preparation of definitive work packages for permitting and subcontracted construction. Potential problem areas:

- Contractor verifications of site conditions
- Timely development and maintenance of contractor
- Experienced planning and scheduling staff
- Realistic schedules and implementation plans
- Following plans and schedules

Schedule conflicts - Many schedule conflicts arose during the performance period. At various times the contracts were constrained by Central Office facilities renovations, access, the availability of trained personnel, and materials deliveries. Recovery plans were used to schedule around the constraints and resolve schedule conflicts. ARENTO and Contractor team members now agree the long-term solution to improved schedule control appears to be a more detailed activity analysis of installed quantities, subcontractor staff, materials and construction equipment.

Materials and Documentation - The correct type and quantities of materials must be ordered on time and to delivered when they are needed. Potential problem areas:

- Development of estimated Bills of Quantities (BOQ)
- BOQ maintenance from engineered drawings
- Maintaining an audit trail to engineering drawings
- Decisions on warehouse inventories
- Disposal of surplus materials
- Purchasing lead times for deliveries at site
- Manufacturer's certifications and test results
- Shipping documentation
- ARENTO furnished materials
- Quantification of variation orders

Computer Aided Design - The contractor should use a Computer Aided Design system to automate and integrate design, material control and construction processes. ARENTO should consider developing country wide CAD drawing standards and begin establishing an electronic data base.

I EXECUTIVE SUMMARY

Achievements and Recommendations

ORGANIZING AND STAFFING

Organization Charts - The ARENTO organization is large and the relationships with the CMC and contractors are complex. Since ARENTO operates primarily through informal vertical channels, there is a need for a formal organization chart to define organizational relationships and responsibilities. Administrative channels should be well defined to improve communication and avoid confusion.

Staffing - A successful project is dependent upon obtaining the right mix of people to get the work done. Staff with the proper mix of skills and experience and develop tools and systems for ARENTO to effectively execute projects. It is recommended that staffing roster controls be considered to ensure the contractor has a dedicated engineering and construction staff. Potential problem areas:

- Adequate expatriate site supervision
- Scheduling Engineer
- Specialists in quality and safety

- "Project" experience
- Turnover of key personnel (Approval process required)
- Timely contractor home office technical support

Organizational Approach - The CMC staff worked with its ARENTO counterparts and Contractor personnel to facilitate day-to-day project activities. The organizational efforts were informal learning by doing task exercises in planning, solving problems, and issuing written correspondence or meeting notes to confirm agreed actions. The same approach was used at the Field Exchange, Functional Department and Executive Management levels.

Project management skills - The skills developed by actual experience in scheduling work, supervising construction personnel, dealing with subcontractors, administering contracts, monitoring progress and controlling costs are the skills most needed by ARENTO. ARENTO personnel need to be "motivated" to assume additional responsibility for these tasks.

Communications - Functional meetings were held to achieve a "buy-in" between Planning, Projects, Switching, Outside Plant, and Transmission departments and the Zone Managers. The meetings, which were sponsored by the ARENTO Project Managers for DSS or OSP work, were used to resolve misunderstandings and expedite critical items. As examples, improved communications resulted from including Project representatives at Planning meetings, assigning O&M Engineers to the COM implementation team, reviewing major contract execution changes with Stores & Purchases and Planning. Productive departmental relations were promoted with weekly site meetings (using published action item lists) and frequent visits to construction areas.

I EXECUTIVE SUMMARY

Achievements and Recommendations

Contact List - A list of technical contacts and communications information was maintained for all key project personnel. This list was used for document distribution and emergency access.

Subcontractor Schedules - Subcontractors should be responsible for developing and maintaining a schedule that coordinates their activities with the engineering work package schedule and overall implementation plan. The OSP Contractor was observed directing subcontractors on a day-to-day basis; this short-term planning horizon frustrates the efficient use of resources.

CONTRACT ADMINISTRATION

Contractor's Manuals and Field Engineer's Manuals - These manuals were developed to guide and implement the administrative controls for the host country contracts. The manuals were introduced with training support and distributed throughout ARENTO. Guidelines were designed to focus "accountability" and to provide feed-back on progress and performance

Work Processes - Work processes specified in the host country contracts were defined in specific planning documents submitted by the host country contractors. Multiple reviews of the Execution Plans, Quality and Test Plan, Documentation Plan, Training Plan, and O&M Plan were required to obtain closure on the scope of work. Special "Methods of Procedure" were developed for the complex construction operations like the Canal Crossing in Alexandria. The Field Engineer's Manual was translated into Arabic and electronic copies were provided to the follow on USAID-TSS Project.

Records Management - Procedures for correspondence, technical document distribution and records retention must be initiated at project inception. An awareness of the importance of the "written-word" must be developed. It was a practice to have correspondence referenced to specific contract requirements. The Project Team needed to follow-up to obtain the documentation required within the CMC framework.

Change Control - Written communications must be used to establish design bases and document changes. Procedures for review, approval, and acceptance of both engineering and construction work need to be set-up with the requirements for design control and change management. Variation Orders, which incorporate major items not initially contemplated that require extra time or money for changed conditions, receive top level attention and need to be carefully monitored. For site close-out, establish a program to reconcile "as built" construction with approved engineering drawings and contract specifications.

I EXECUTIVE SUMMARY

Achievements and Recommendations

Value Engineering Changes - The established change process needs to be more flexible to encourage value engineering. For example, installation and testing specifications that were found to be out of date were not changed.

Bills of Quantities (BOQ) - Accurate quantity information was the backbone of the contract control program. Estimated quantities provided the basis for determining what work must be done, and installed quantities provided the measure of progress. It follows that without accurate quantities, the project will not know where it is, where it's going, or the rate it must go to complete on time. The CMC must have quantity control systems well thought out for discussion at the Construction Kickoff Meeting.

Preliminary Contract Deliverables - Controls are needed to make sure both ARENTO and the contractors complete preliminary contract tasks. ARENTO must compile traffic data, make building improvements, and finalize systems plans. The contractor must conduct field investigations, review planning information, check drawings for constructability, and confirm major schedule milestones, complete plans, and order materials in a timely manner.

Supervision of Subcontractors - All terms of the prime contract must be "flow down" to the subcontractors. Subcontractors must follow the approved implementation plans and implement a coordinated scheduling system. Potential problem areas:

- Active supervision of subcontractors is required to ensure that quality and schedule commitments are met.
- Items of work that merit control should be quantified
- Always have a contractor supervisor on site to direct work
- Maintain a resource loaded schedule

QUALITY & SAFETY

The primary responsibility for verifying that the quality and safety of work is in compliance with the specifications, drawings, and other standards belongs to the contractor and subcontractors. The contractor's quality and safety organization should be actively supported by ARENTO and CMC inspectors. The contractor should train construction personnel and subcontractors in quality control procedures and ensure that proper inspection is being performed.

Quality and Safety Plans - The quality and safety programs were patterned to fit the size and character of work in Egypt. The requirement to establish specific plans and adhere to contractual provisions needs to be enforced. Specific safety policies and procedures should be included in site installation methods of procedures.

I EXECUTIVE SUMMARY

Achievements and Recommendations

The CMC's Site Managers were assigned as the single point of contact, responsible for managing the contractor's actions. The site manager must monitor the performance of all installations, tests, inspections and operations for technical compliance. Contractor surveillance with oral, followed by written, notice of discrepancies or unsafe areas is necessary to correct severe conditions.

Effective quality assurance or quality control programs - Potential problems:

- Compliance with QA/QC plan and procedures
- Timely clearance of Discrepancy Reports
- Cost of rework due to construction discrepancies
- Damage to public and private property, e.g., the damage to water sewer, electrical, shrubs, walls

The safety functions were continuously addressed. The safe work procedures were reinforced with written policies and procedures. Regular safety meetings and feedback on serious incidents combined with a higher levels of supervision were needed to ensure that a safe work site was maintained. Training guidelines and specific methods of procedure for complex field construction tasks need to be developed for use by subcontractors performing the work.

Potential problem areas:

- Heavy lift calculations
- Certification of construction equipment
- Shoring of excavations
- Lighting for night work
- Barricades
- Clothing (shoes, hard hats, glasses)
- Identification of utility interferences
- Proper use of safety equipment

TRAINING

Classroom Training - USAID sponsored training programs in Digital Switching, Outside Plant and O&M were successfully carried out by the Host Country Contractors. AT&T trainers supported by ARENTO's Training Center enabled large numbers of ARENTO engineers to receive customized training. DSS schooling conducted by AT&T in the US was reported to have been effective. The consensus was that classes should be held in Egypt to accelerate the transfer of teaching skills to ARENTO's Training Center, whenever possible.

On-the-job Training (OJT) - It was noted that a large number of ARENTO engineers received classroom training, but were not assigned to the Telecoms IV Expansion. These individuals should work with the USAID sponsored team to reinforce the skills learned in the classroom.

I EXECUTIVE SUMMARY

Achievements and Recommendations

O & M Training - DSS and OSP maintenance contracts require the contractor to maintain the system and conduct hands on training. The Contractor's installation and test crew was experienced and able to carry out effective training programs. The Chief Sector for OSP Projects and Zone Managers are dedicating the personnel needed to carry out the O&M processes and refine work operations through field trials. ATTI has agreed to update the O & M Plan based on the lessons learned during the maintenance period. This extra effort at each outside plant exchange should help institutionalize the transfer of maintenance/test and repair skills.

The ARENTO Training Center in Nasser City - The Training Center has capable leadership and the ability to organize and deliver technical and administrative training programs. Additional use should be made of the ARENTO facilities to further organizational development.

Project Management Training - The CMC sponsored the transfer of skills in project planning and execution. Training and example materials were provided for CPM scheduling, subcontract administration, field engineering and inspection. An Outside Plant Field Engineers Manual was prepared and translated into Arabic. Special assistance was provided to guide the preparation of switch cutover plans and initiate the development of COM System operating procedures and computerized reporting programs.

I EXECUTIVE SUMMARY

CMC Financial Summary

COST BASIS

The Budget reflects contract changes through Modification Number 5.

The total estimated cost for the CMC Services Contract is \$4,923,936. This amount includes unbilled costs of \$159,100 for settlement of the Teleconsult, Inc. subcontract and OBI's administrative close-out activities.

FINAL COST FORECAST

<u>Category</u>	<u>Budget</u>	<u>Final Cost Forecast</u>
Salaries, Wages & Fringe Benefits	\$1,346,506	\$1,396,701
Indirect Costs	816,821	825,393
Consultant & Subcontracts	1,504,320	1,494,069
Travel, Transportation & Per Diem	211,062	147,063
Allowances	270,647	250,331
Vehicles & Equipment	185,225	161,826
Other Direct Costs	<u>232,140</u>	<u>232,739</u>
Total Costs	4,566,721	4,508,122
Total Fee	<u>427,814</u>	<u>427,814</u>
Total Cost Plus Fee	4,994,535	4,935,936

USAID-EGYPT TELECOMS IV EXPANSION PROJECT

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II PROJECT SCOPE AND HISTORY

Digital Switching Systems (DSS) Contract

GENERAL

Contract No. 10/92/21 between ARENTO and AT&T International, Inc. (ATTI) was signed on October 15, 1992 and became effective on November 3, 1992 when it was funded. The contract required ATTI to design, furnish, install and maintain AT&T #5ESS digital electronic central office switches on a turnkey basis. The Centralized Operations and Maintenance (COM) System was funded on May 24, 1993; the Giza 19K Addition on November 21, 1994.

- **Opera Exchange, Ataba Square, Cairo Egypt**

Switch Size: 20,000 Lines #5ESS; 53 Line Units; 13 Switch Modules.

- **Giza Exchange, Giza Square, Cairo Egypt**

Switch Size: 24,000 Lines #5ESS (20,000 New Lines, 4,000 Lines from existing remote switch matrix); 56 Line Units (8 from RSM); 14 Switch Modules (1 from RSM). An 19,000 line expansion was executed under Amendment No. 4.

- **Ramsis Exchange, Ramsis Square, Cairo Egypt**

Switch Size: 20,000 Lines #5ESS; 53 Line Units; 13 Switch Modules.

- **Pyramid Exchange, Pyramid Road, Pyramid, Cairo Egypt**

Switch Size: 24,000 Lines #5ESS (20,000 New Lines, 4,000 Lines from existing remote switch matrix); 56 Line Units (8 from RSM); 18 Switch Modules (1 from RSM).

- **COM System, El-Khala, Cairo Egypt**

The Centralized Operation and Maintenance (COM) System will integrate the maintenance and repair functions of the #5ESS switch nodes.

Amendment No. 2 includes: MFOS, TFS and SDAS Equipment and Software with 3B2/1000, Model 80B processor; Datakit Equipment, modems for basis MFOS, UPS and standby power systems; Training.

II PROJECT SCOPE AND HISTORY

Digital Switching Systems (DSS) Contract

KEY PERSONNEL

ARENTO Eng. Belkais El-Said
ARENTO Vice Chairman
The ARENTO Vice Chairman directs Telecommunications IV activities and chairs the Monthly Progress Review to coordinate the program.

Eng. Mahmoud Abu Shady
Ch. Central Administration - Digital Switching Systems Directs General Manager for Switching Projects, as required.

Eng. Mohamed Montasser
General Manager Switching Projects (Project Manager)
ARENTO Switching is responsible for technical contract execution and administration, after award. The General Manager for Switching Projects is the primary ATTI point of contact. All significant change requests are coordinated with Planning and Stores Purchases by the G.M. for Switching Projects.

Eng. Aly El-Dessouky
Ch. Central Administration Stores & Purchases
ARENTO Stores and Purchases is responsible for commercial activities including contract award, insurance, guarantees, and the final processing of progress payment vouchers and contract changes.

USAID Eng. Reem Gohar
Project Officer

Eng. Fatein Mahmoud
Project Officer - COM Center

Bechtel Oliver Sweningsen
Project Manager - Operations and Planning

Lee McDaniel
Lead D.S.S. Engineer - Digital Switching Systems

Arun Nayar
Commercial Manager - Contracts & Accounting

AT&T Mr. R. J. (Jim) Terry
Operation Director - Middle East

Mr. Al Gross
Project Manager

II PROJECT SCOPE AND HISTORY

Digital Switching Systems (DSS) Contract

MILESTONE SCHEDULE HIGHLIGHTS

Opera

<u>Opera Schedule Milestones (1)</u>	<u>BASELINE SCHEDULE</u>	<u>CPM SCHEDULE</u>
Effective Date of Contract:	Nov 3, 1992	Nov 3, 1992A
Equipment Shipped:	Nov 4, 1992	Nov 4, 1992A
Installation Start:	Dec 17, 1992	Dec 17, 1992A
All Equipment On-Site:	Dec 24, 1992	Jan 10, 1993A
Trans. Facility Ready:	Jul 5, 1993	Jul 29, 1993A
Function Test Complete:	Jun 27, 1993	May 31, 1993A
Training Complete:	Oct 1, 1993	May 1, 1994A
OSP Ready - Initial:	Jul 5, 1993	Jul 29, 1993A
Load Test Complete:	Jul 31, 1993	Jun 20, 1993A
Pre-cutover Tests Complete:	Jul 28, 1993	Jul 22, 1993A
Cutover Complete:	Aug 10, 1993	Jul 22, 1993A
Provisional Acceptance:	Sep 18, 1993	Aug 29, 1993A
Final Acceptance :	Sep 21, 1994	Sep 17, 1994A

Notes:

1. Milestone analysis based on ATTI revised Implementation Plan schedule, dated February 15, 1993.
2. Cutover was established on July 22nd, 1993, and provisional acceptance was completed August 29, 1993. Final acceptance was effective September 17, 1994.

II PROJECT SCOPE AND HISTORY

Digital Switching Systems (DSS) Contract

Giza

<u>Giza Schedule Milestones (1)</u>	<u>BASELINE SCHEDULE</u>	<u>CPM SCHEDULE</u>
Effective Date of Contract:	Nov 3, 1992	Nov 3, 1992A
Equipment Shipped:	Nov 4, 1992	Nov 4, 1992A
Installation Start:	Dec 18, 1992	Dec 18, 1992A
All equipment on-site:	Dec 23, 1992	Dec 23, 1992A
Trans. Facility Ready:	Aug 1, 1993	Sep 11, 1993A
Function Test Complete:	Jun 27, 1993	Jun 30, 1993A
Training Complete:	Oct 1, 1993	May 1, 1994A
OSP Ready - Initial:	Aug 1, 1993	Oct 5, 1993A
Load Test Complete:	Jul 31, 1993	Jul 25, 1993A
Pre-cutover Test Complete:	Jul 26, 1993	Aug 5, 1993A
Cutover Complete:	Aug 10, 1993	Aug 6, 1993A
Provisional Acceptance:	Sep 19, 1993	Sep 12, 1993A
Final Acceptance :	Sep 19, 1994	Oct 13, 1994A
Cutover 4K ADD :	Oct 19, 1993	Sep 29, 1993A
Provisional Acceptance 19K	May 31, 1995	May 27, 1995A

Notes:

1. Milestone analysis based on ATTI revised Implementation Plan schedule, dated February 15, 1993.
2. Cutover for the 20K host switch was established on August 6, 1993, and Provisional Acceptance was completed on September 12, 1993. Final acceptance was effective October 13, 1994.
3. Cutover for the 4K addition was established on September 29, 1993, and Provisional Acceptance was completed November 4, 1993. Cutover for the 19K addition was established on April 27, 1995, and Provisional Acceptance was completed May 27, 1995.

II PROJECT SCOPE AND HISTORY

Digital Switching Systems (DSS) Contract

Ramsis

<u>Ramsis Schedule Milestones (1)</u>	<u>BASELINE SCHEDULE</u>	<u>CPM SCHEDULES</u>
Effective Date of Contract:	Nov 3, 1992	Nov 3, 1992A
Equipment Shipped:	Nov 4, 1992	Nov 4, 1992A
Installation Start:	Apr 26, 1993	Mar 27, 1993A
All Equipment on Site:	May 2, 1993	May 19, 1993A
Trans. Facility Ready:	Oct 24, 1993	Nov 10, 1993A
Function Test Complete:	Sep 19, 1993	Sep 30, 1993A
Training Complete:	Oct 1, 1993	May 1, 1994
OSP Ready - Initial	Sep 20, 1993	Nov 10, 1993A
Load Test Complete:	Oct 31, 1993	Oct 12, 1993A
Pre-cutover Test Complete:	Oct 31, 1993	Nov 10, 1993A
Cutover Complete:	Nov 2, 1993	Nov 11, 1993A
Provisional Acceptance:	Dec 9, 1993	Dec 18, 1993A
Final Acceptance:	Dec 12, 1994	Dec 17, 1994A

Notes:

1. Milestone analysis based on ATTI revised Implementation Plan schedule, dated February 15, 1993.
2. Cutover for the 20K switch was established on November 11, 1993, and Provisional acceptance was completed on December 18, 1993.

II PROJECT SCOPE AND HISTORY

Digital Switching Systems (DSS) Contract

Pyramid

<u>Pyramid Schedule Milestones</u> (1)	<u>BASELINE</u> <u>SCHEDULE</u>	<u>CPM</u> <u>SCHEDULE</u>
Effective Date of Contract:	Nov 3, 1992	Nov 3, 1992A
Equipment Shipped:	Mar 7, 1993	Apr 11, 1993A
Installation Start:	Apr 26, 1993	May 11, 1993A
All Equipment on-site	Apr 24, 1993	May 25, 1993A
Trans. Facility Ready	Oct 24, 1993	Oct 27, 1993A
Function Test Complete:	Sep 19, 1993	Oct 12, 1993A
Training Complete:	Oct 1, 1993	May 1, 1994A
OSP Ready - Initial:	Oct 1, 1993	Nov 21, 1993A
Load Test Complete:	Oct 31, 1993	Oct 26, 1993A
Pre-cutover Test Complete:	Oct 31, 1993	Nov 21, 1993A
Cutover Complete:	Nov 2, 1993	Nov 22, 1993A
Provisional Acceptance:	Dec 12, 1993	Dec 28, 1993A
Final Acceptance:	Dec 14, 1994	Dec 28, 1994A
Cutover 4K ADD :	Jan 25, 1994	Jan 13, 1994A

Notes:

1. Milestone analysis based on ATTI revised Implementation Plan schedule, dated February 15, 1993.
2. Cutover was established on November 22, 1993, and Provisional Acceptance was completed on December 28, 1993.

II PROJECT SCOPE AND HISTORY

Digital Switching Systems (DSS) Contract

COM System

<u>COM System Schedule Milestones</u>	<u>BASELINE SCHEDULE</u>	<u>CPM SCHEDULE</u>
Effective Date Amend. No. 2	May 24, 1993	May 24, 1993A
Start Installation	Jul 24, 1993	Aug 1, 1993A
All Equipment on Site	Jul 22, 1993	Sep 15, 1993A
Cutover (Operational)	Feb 28, 1994	Sep 30, 1993A
Complete Provisional Acceptance	Apr 28, 1994	Apr 14, 1994A
Complete Training	Apr 14, 1994	Feb 17, 1994A
Start Maintenance	Apr 28, 1994	Apr 14, 1994A
Final Acceptance	Apr 28, 1995	Apr 14, 1995A

Notes:

1. The effective date (Amendment No. 2) was May 24, 1993. The Contract schedule was 40 weeks to cutover.
2. Provisional Acceptance was effective April 14, 1994.
3. Final Acceptance testing at the Alexandria COM Center was successfully completed on April 9, 1995. The Cairo COM Center testing was completed on April 12, 1995.
4. A problem was noted with transmission degradation on the ARENTO communication trunk from Alexandria to Cairo.
5. Consultant and ATTI provided additional training and organizational support for the COM Centers.

II PROJECT SCOPE AND HISTORY

Outside Plant Network (OSP) Contract

GENERAL

The Outside Plant Contract became effective on July 21, 1993. The ATTI design teams were mobilized in August.

Heliopolis Exchange, Heliopolis, Cairo Egypt

Expansion Size (ASPD, Rev. 1, Aug 22nd, 1993)

- 23,700 lines
- 9 x (2400 to 2700 pr.)
- 91 Serving Area Interface Cabinets

Auto Exchange, Alexandria Egypt

Expansion Size (Original Budget)

- 18,600 lines
- 9 x (600 to 2400 pr.)
- 89 Serving Area Interface Cabinets

Giza Exchange, Cairo Egypt

Expansion Size (Original Budget)

- 30,900 lines
- 16 x (1500 to 2100 pr.)
- 144 Serving Area Interface Cabinets
- Rehabilitation and tie-in to the existing network was excluded in Amendment 3.

II PROJECT SCOPE AND HISTORY

Outside Plant Network (OSP) Contract

KEY PERSONNEL

ARENTO Eng. Belkais El-Said
ARENTO Vice Chairman
The ARENTO Vice Chairman directs Telecommunications IV activities and chairs the Monthly Progress Review to coordinate the program.

Eng. Sami Nakhla
Ch. Central Administration - Outside Plant Planning

Eng. Atef El-Kilany - Director Central Administration for Construction

Eng. Joseph Ramzy
General Manager for Outside Plant - Heliopolis Exchange

Eng. Nagwa Hassanein
General Manager for Outside Plant - Auto Exchange Alexandria

Eng. Mohamed Madi
General Manager for Outside Plant - Giza Exchange

Eng. Aly El-Dessouky
Ch. Central Administration Stores & Purchases
ARENTO Stores and Purchases is responsible for commercial activities including contract award, insurance, guarantees, and the final processing of progress payment vouchers and contract changes.

USAID Eng. Reem Gohar
Project Officer

Bechtel Oliver Sweningsen
Project Manager - Operations and Planning

Buddy Stelz
Lead O.S.P. Engineer - Outside Plant

Exchange OSP Field Superintendants
Buddy Stelz - Heliopolis
John Duden - Giza
Earl Jenevein - Auto

AT&T Mr. Dennis Waters
Area Operations Manager

Mr. Merrill Johnson
Project Manager

II PROJECT SCOPE AND HISTORY

Outside Plant Network (OSP) Contract

MILESTONE SCHEDULE HIGHLIGHTS

HELIOPOLIS

<u>Heliopolis Schedule Milestones</u>	<u>BASELINE CONTRACT</u>	<u>BASELINE SCHEDULE</u>	<u>CPM SCHEDULE</u>
Effective Date of Contract	Jul 21, 93	Jul 21, 93	Jul 21, 93A
Submit ASPD	Aug 20, 93	Aug 19, 93	Aug 20, 93A
Receive Approved ASPD	Sep 20, 93	Sep 15, 93	Sep 15, 93A
Complete Test Digs	Sep 20, 93	Nov 04, 93	Feb 05, 94A
Materials At Site	Jan 20, 94	Jan 24, 94	May 20, 94A
Complete Civil and Cable Eng.	Jun 15, 94	May 18, 94	Jun 30, 94A
Complete Installation	Oct 16, 94	Jul 25, 94	Jan 07, 95A
Complete Testing	Dec 1, 94	Aug 20, 94	Jan 07, 95A
Complete Provis. Acc. P-I	---	Jul 06, 94	Feb 01, 95A
Complete Provis. Acc. P-II	---	Aug 02, 94	Feb 09, 95A
Complete Provis. Acc. P-III	---	Oct 08, 94	Feb 26, 95A
Complete Exchange Provis. Acc.	Mar 13, 95	Oct 23, 94	Aug 29, 95A
Complete As Built	Feb 20, 95	Nov 07, 94	Sep 13, 95F
Final Acceptance	Mar 20, 96	Sep 02, 95	Aug 29, 96F

Notes:

1. Exchange Provisional Acceptance was effective August 29, 1995.
2. Completion of grounding upgrades at EDCT and SAI cabinets must be completed as a condition of Final Acceptance.
3. The ARENTO/Contractor Maintenance Team is operational.
4. The Contractor will complete the transfer of "as-built" drawings and Project documentation at the end of the Maintenance Period.

II PROJECT SCOPE AND HISTORY

Outside Plant Network (OSP) Contract

AUTO

<u>Auto Schedule Milestones</u>	<u>BASELINE CONTRACT</u>	<u>BASELINE SCHEDULE</u>	<u>CPM SCHEDULE</u>
Effective Date of Contract	Jul 21, 93	Jul 21, 93	Jul 21, 93A
Submit SPD	Sep 15, 93	Oct 26, 93	Oct 26, 93A
Received Approved SPD	Oct 15, 93	Dec 13, 93	Dec 13, 93A
Submit ASPD	Nov 15, 93	Jan 11, 94	Jan 11, 94A
Complete Test Digs	Jan 20, 94	Jan 06, 94	Jan 06, 94A
Materials At Site	Feb 20, 94	May 08, 94	Jan 20, 95A
Complete Civil and Cable Eng.	Sep 20, 94	Jul 02, 94	Jun 21, 94A
Complete Installation	Nov 21, 94	Dec 04, 94	Feb 28, 95A
Complete Testing	Jan 1, 95	Dec 24, 94	Mar 11, 95A
Complete Provis. Acc. P-I	---	Jan 16, 95	Feb 15, 95A
Complete Provis. Acc. P-II	---	Oct 16, 94	Mar 12, 95A
Complete Provis. Acc. P-III	---	Oct 02, 94	Mar 01, 95A
Complete Exchange Provis. Acc.	Mar 13, 95	Jan 17, 95	May 27, 95A
Complete As Builts	Feb 20, 95	Feb 23, 95	May 15, 95A
Final Acceptance	Mar 20, 96	Feb 06, 96	May 31, 96F

Notes:

1. Exchange Provisional Acceptance was effective May 27, 1995.
2. Completion of remedial work to replace EDCT terminals with upgraded aluminum enclosures must be completed as a condition of Final Acceptance.
3. The ARENTO/Contractor Maintenance Team is operational.
4. The Contractor will complete the transfer of "as-built" drawings and Project documentation at the end of the Maintenance Period.

II PROJECT SCOPE AND HISTORY

Outside Plant Network (OSP) Contract

GIZA

<u>GIZA Schedule Milestones</u>	<u>BASELINE CONTRACT</u>	<u>BASELINE SCHEDULE</u>	<u>CPM SCHEDULE</u>
Effective Date of Contract	Jul 21, 93	Jul 21, 93	Jul 21, 93A
Submit SPD	Oct 14, 93	Jan 03, 94	Jan 03, 94A
Receive Approved SPD	Dec 15, 93	Feb 02, 94	Feb 02, 94A
Submit ASPD	Jan 15, 94	Apr 30, 94	May 11, 94A
Complete Test Digs	Feb 20, 94	Jun 14, 94	Oct 06, 94A
Materials At Site	May 10, 94	Jul 19, 94	Feb 12, 95A
Complete Civil and Cable Eng.	Oct 31, 94	Jan 01, 95	Oct 27, 94A
Complete Installation	Jan 16, 95	Jan 22, 95	Aug 15, 95F
Complete Testing	Jan 31, 95	Feb 14, 95	Sep 09, 95F
Complete Provis. Acc. P-I	---	Nov 13, 94	
Complete Provis. Acc. P-II	---	Nov 08, 94	
Complete Provis. Acc. P-III	---	Dec 17, 94	
Complete Provis. Acc. P-IV	---	Nov 26, 94	
Complete Provis. Acc. P-V	---	Dec 13, 94	
Complete Provis. Acc. P-VI	---	Jan 23, 95	
Complete Exchange Provis. Acc.	Mar 13, 95	Feb 08, 95	Sep 28, 95A
Complete As Built	Feb 28, 95	Feb 12, 95	Sep 22, 95A
Final Acceptance	Mar 20, 96	Feb 11, 96	Sep 28, 96F

Notes:

- Exchange Provisional Acceptance was effective September 28, 1995. Delayed completion was excused primarily due to permitting delays.
- To accelerate service dates, individual cables were tested, inspected and provisionally accepted as sector entities. Sector Provisional Acceptance dates are:

Cable	Date	Cable	Date
44	Aug. 01, 95	42	Aug. 24, 95
45	Aug. 01, 95	43	Aug. 24, 95
46	Aug. 01, 95	52	Aug. 31, 95
47	Aug. 01, 95	38	Sep. 02, 95
50	Aug. 08, 95	41	Sep. 07, 95
48	Aug. 08, 95	53	Sep. 07, 95
49	Aug. 08, 95	42	Sep. 14, 95
51	Aug. 08, 95	43	Sep. 14, 95

- The ARENTO/Contractor Maintenance Team is operational. The Contractor will transfer "as-built" drawings and Project documentation at the end of the Maintenance Period.

**USAID-EGYPT
TELECOMS IV EXPANSION PROJECT**

III PROGRESS PHOTOS

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Digital Switching Systems



GIZA DSS CONTROL ROOM

Pre-cutover Testing

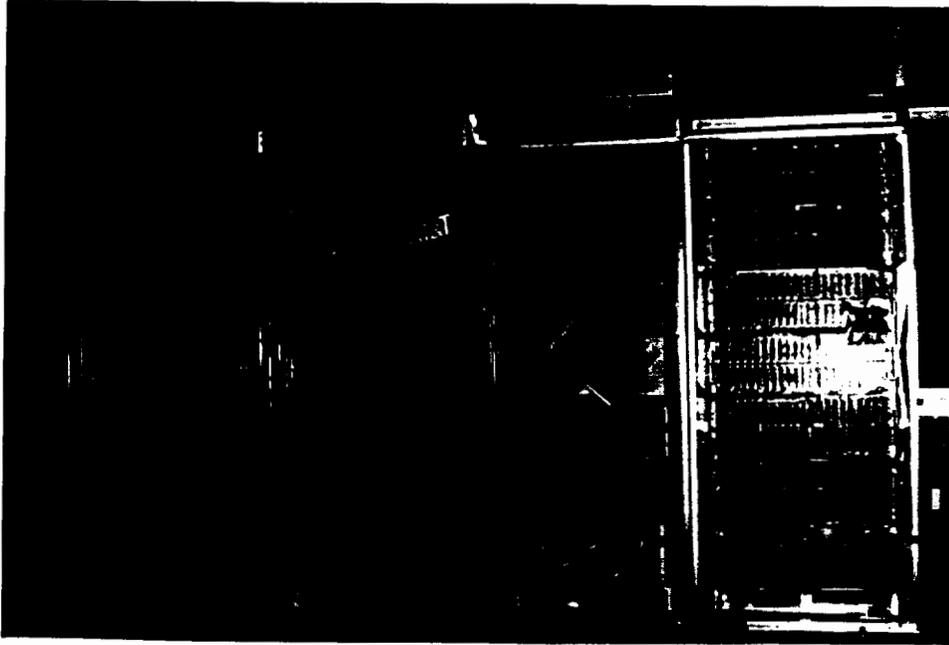


ALEXANDRIA COM CENTER

ARENTO Presentation To USAID

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Digital Switching Systems



RAMSIS SWITCHROOM
Alignment Of #5ESS Frames

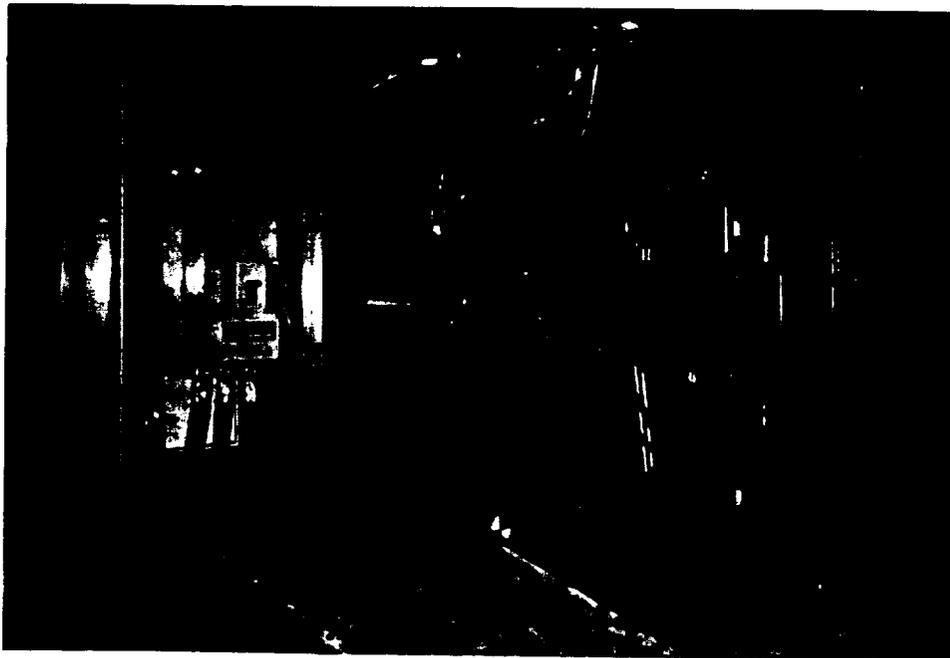


OPERA MAIN DISTRIBUTION FRAME (MDF)
Pre-cutover Trouble Shooting

Digital Switching Systems

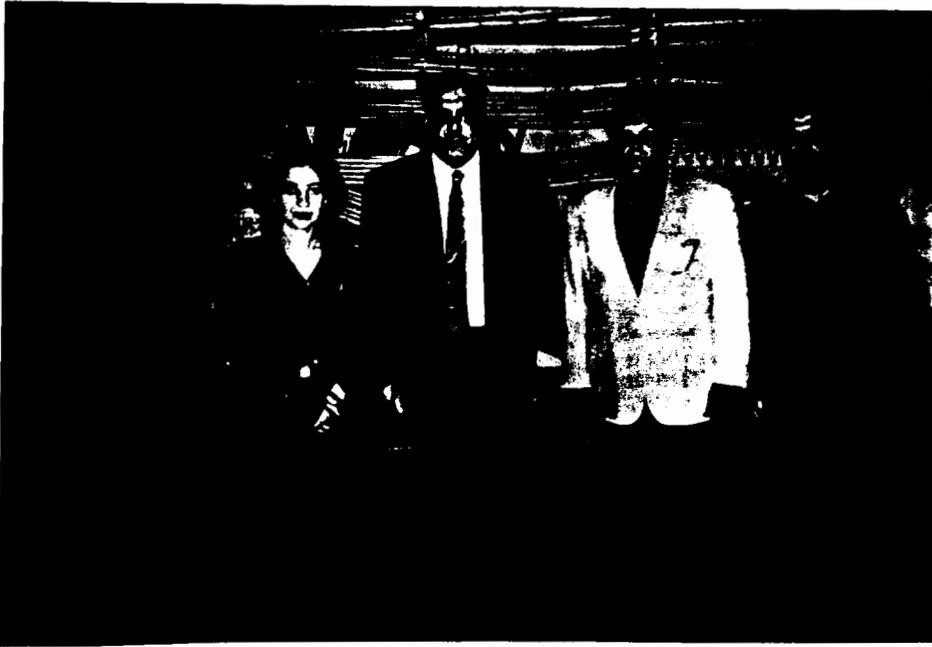


GIZA DC POWER ROOM
Charging Batteries With Acid



GIZA EMERGENCY DIESEL GENERATOR
Provisional Acceptance Testing

Outside Plant Network



AUTO MAIN CABLE VAULT

USAID and ARENTO Visit For Provisional Acceptance



HELIOPOLIS NETWORK

SAI Cabinet Inspection

Outside Plant Network



HELIOPOLIS NETWORK CONSTRUCTION

Excavation for Conduit Ductbank



GIZA MANHOLE INSTALLATION

Night Work In Giza Square

USAID-EGYPT TELECOMS IV EXPANSION PROJECT

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Teleconsult DSS Report

**FINAL REPORT
FOR
DIGITAL SWITCHING SYSTEMS (DSS)**

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EXECUTIVE SUMMARY

The attached Final Report covers the Digital Switching System (DSS) portion of the Telecommunications IV - Expanded contract between USAID and Overseas Bechtel, Inc. (OBI) with Teleconsult, Inc. as the subcontractor to OBI. It was Teleconsult's responsibility to oversee the technical aspects of the installation of the DSS project as summarized in this report.

The DSS project consists of the addition of four 20,000 line AT&T #5ESS digital switches to be located at four existing ARENTO central office locations, namely: Ramsis, Opera, Pyramids and Giza. The project also included the installation of a Centralized Operations and Maintenance Center (COM center) to monitor and control all #5ESS switches.

A contract between ARENTO and AT&T International (ATTI) was signed in October 1992 to design, furnish and install the four #5ESS digital switches on a turnkey basis with the COM center to be added later. The following cutover dates were established for the four switches and are shown along with the actual dates that the digital switches were cutover.

<u>DSS location</u>	<u>Scheduled date</u>	<u>Actual date</u>
Opera	08/10/93	07/22/93
Giza	10/05/93 (08/10/94)	08/06/93*
Ramsis	08/10/93 (11/02/94)	11/12/93*
Pyramid	11/02/93	11/22/93**

* ARENTO requested that the Giza and Ramsis schedules be interchanged as Ramsis site was not available and a cutover date of 11/02/94 was agreed to for Ramsis. Switch was ready for cutover on 11/02/94, but delayed by Ramsis AC/DC power system.

** Included transfer of lines from Crossbar which were not included in original 11/02/93 cutover date. (Transfer of lines were not included in any original switch cutover date).

OPERA EXCHANGE: Upon completion of the 20,000-line #5ESS, Opera should have had 30,000 lines of crossbar and 20,000 lines of #5ESS for a total site capacity of 50,000 lines. Due to the slow progress in transferring all of the selected crossbar numbers, more than 2,500 customers remained at Provisional Acceptance, adjusting the total capacity to approximately 52,500. (Another USAID project during 1994 will increase the site capacity to 40,000 lines of #5ESS.)

Even though Opera was a relatively well organized and prepared site, there were still

several problems that were successfully addressed which allowed the switch to proceed to a "ready for cutover" state. The network and MDF preparations were at best, very poor. The good that came from this cutover allowed the DSS team to concentrate upon network preparations and MDF activities at the Giza site in hopes of showing ARENTO how to improve their techniques.

For several weeks after cutover, there were long lines of customers at the MDF room and the DSS door complaining about out-of-service lines, can't-call-their-neighbors, or can't-be-called because no one knows their new number. Even physicians and at least one hospital were affected. In essence, the network preparations were a severe disappointment because no matter how much prodding by the DSS team, Opera was going to cutover like always. Regretfully, this overshadowed a lot of good work that preceded the cutover.

GIZA EXCHANGE: Upon completion of the 20,000-line #5ESS, Giza had 20,000 lines of crossbar and 24,000 lines of #5ESS for a total site capacity of 44,000 lines. (A Commodity Import Program, AID Grant No. 263-K-624, during 1994 increased the site capacity to 34,000 lines of #5ESS.)

Even though Giza was the best organized and prepared site, there were still problems that had to be addressed to allow the switch to proceed to a "ready for cutover" state. The same was not true of the network. Further, if complaints and troubles were available for the five days immediately after cutover, the numbers of line troubles would match the long lines of customers complaining about out-of-service lines, can-no-longer-call their neighbors, can't-be-called because no one knows their new number. In essence, the network preparations were woefully lacking no matter how much prodding by the DSS team. This overshadowed the good work that preceded the cutover.

RAMSIS EXCHANGE: Upon completion of the 20,000-line #5ESS, Ramsis had 30,000 lines of crossbar, 20,000 lines of #5ESS, and 7,000 lines of NEC for a total site capacity of 57,000 lines. (Another USAID project during 1994 will increase the site capacity to 40,000 lines of #5ESS.)

Even though Ramsis was not a well designed and prepared site, the multitude of problems were successfully addressed and the switch progressed to a "ready for cutover" state. The same was also true of network preparations. It was clearly an example of what ARENTO can do when they dedicate themselves to working together. Ramsis was so different from the other sites, it was used throughout the exit briefing with ARENTO and USAID as to what is a reasonable expectation that ARENTO's organization can produce.

The material presented at the exit briefing was not always positive because Ramsis had far too many problems to be totally positive. The material was intended to show what went wrong and the actions used to correct or compensate for the problems. It was used to show ways of realistically monitoring progress using techniques totally different from usual habits.

PYRAMID EXCHANGE: Upon completion of the #5ESS, Pyramid had 20,000 lines of crossbar, 6,000 lines of NEC in Mobile Vans, and 24,000 lines of #5ESS for a total site capacity of 40,000 lines. (A Commodity Import Program, AID Grant No. 263-K-624, during 1994 increased the site capacity to 34,000 lines of #5ESS.

Even though there was tremendous effort on the part of AT&T, the DSS team, and some members within ARENTO to overcome the problems and have the switch reach a "ready for cutover" state, it was still a very poor cutover. However, after the cutover, the RSM relocation, and completion of the MCC, this proved to be one of the best designed sites within ARENTO. Granted, good appearance isn't necessarily good performance but the trunking statistics collected by the COM Center showed Pyramid as one of the best performers of all ESS sites. It was only second best to Ramsis of the new sites.

To ARENTO's credit, they did pursue the trunking aspect of their network after cutover and made significant improvements. If that same effort was applied to the line side of the switch, many thousands of people on the waiting list could have had telephone service. The MDF preparations were woefully lacking no matter how much prodding by the DSS team. This overshadowed a tremendous amount of good work that preceded the cutover.

Pyramid had the benefits of all the experience gained at the first three sites. ARENTO chose not to take advantage of any of that information. Pyramid had all of AT&T resources available for any kind of support they needed but they chose not to use them until they had to prepare for the dedication and the Minister. Pyramid had access to an MDF crew that just completed an outstanding job at Ramsis but they didn't use them. Instead, they ran over 6,850 jumpers for transfer but only used 6,338 of them because the rest were incorrect. They also had access to one of the best transmission engineers on ARENTO's staff but severely angered him every time he tried to help. They had their own resident engineer on-site and didn't need that staff in their office.

COM CENTER:

The COM center provides support in the areas of switch maintenance, operations, alarm processing, traffic data collection and analysis, and subscriber and trunk assignment. The COM center is located in the El Kalaa exchange in Cairo, with a small satellite center in the Auto exchange in Alexandria. The two locations are interconnected by a software trunk (SWT). All #5 ESS exchanges are connected to the COM center by six cable pairs for sending and receiving data. The COM center was cutover and became operational on September 30, 1993. The center was used for training of ARENTO personnel from October 18, 1993 until February 16, 1994. Provisional testing began on March 21, 1994, completed on April 14, 1994, and a Provisional Certificate issued on April 14, 1994.

LESSONS LEARNED: The DSS Team spent over a year in Cairo working with ARENTO, USAID and AT&T. They gained considerable insight and appreciation of the strengths and weaknesses of the involved organizations. The paragraphs in the Final Report express their

impressions and are not meant to be critical. They are expressed in the hope that they will be viewed as constructive and will help to strengthen ARENTO in meeting future challenges in provisioning additional switching capacity in Cairo.

The comments in the report are to show ARENTO and USAID that making only technological changes within their network will not provide the improvements that could be made. They may improve the network marginally, but will not bring about the changes USAID expects.

CONCLUSION: All four 20,000-line digital switches were cut over essentially on schedule and in accordance with the specifications. There were many problems encountered during the installation and cutover as covered in the report. Most of the problems could have been avoided and should not re-occur during future DSS installations. Unfortunately, however, they will re-occur unless ARENTO learns from the experience with these four switches and improves their coordination and inter-departmental cooperation.

The Lessons Learned are stated as the Consultants saw them and are not meant to be demeaning of ARENTO. They could have been sanitized to indicate things went smoothly, but this would not have helped ARENTO in the long run. The only way to improve is to learn from experience and that is the basis for the comments included in this Final Report.

The ARENTO telecommunications network has been greatly improved over the past ten years or so and the potential is there for even greater improvements. However, the key to these improvements is not necessarily more equipment, but better usage of the network already in place and planned. As discussed in the report, a change in management attitude is essential to establish inter-departmental cooperation and effective management teams that will work together for the good of the organization. A change in attitude towards the customer is also badly needed to enhance ARENTO's reputation in the community, both business and residential.

A major step in this direction is the proposed USAID project covering the Institutional Development of ARENTO. If the results of this program are taken seriously by ARENTO's top management and the changed attitudes are supported by all management levels, a major improvement in network service should result. DSS installations and cutovers should become routine and assistance of consultants should no longer be required.

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1.0 INTRODUCTION:

This Final Report will cover the Digital Switching System (DSS) portion of the Telecommunications IV - Expanded contract between USAID and Overseas Bechtel, Inc. (OBI) with Teleconsult, Inc. as the subcontractor to OBI. It was Teleconsult's responsibility to oversee the technical aspects of the installation of the DSS project as summarized in this report.

The DSS project consists of the addition of four 20,000 line AT&T #5ESS digital switches to be located at four existing ARENTO central office locations, namely: Ramsis, Opera, Pyramids and Giza. The project also included the installation of a Centralized Operations and Maintenance Center (COM center) to monitor and control the all #5ESS switches. It was the responsibility of Teleconsult to oversee the installation of the digital switches and the COM Center to ensure that they were installed in accordance with the specifications and on schedule.

A contract between ARENTO and AT&T International (ATTI) was signed in October 1992 to design, furnish and install the four #5ESS digital switches on a turnkey basis with the COM center to be added later. The following schedules were established for these installations:

Milestones	Giza	Opera	Ramsis	Pyramid
Effective Date of Contract	11/03/92	11/03/92	11/03/92	11/03/92
Equipment Ship	11/15/92	11/10/92	11/15/92	03/07/93
Installation Start	02/23/93	01/30/93	02/07/93	05/02/93
Installation Test Complete	08/23/93	06/26/93	06/29/83	09/19/93
Training Complete	TBD	TBD	TBD	TBD
Pre-cutover Test Complete	10/04/93	08/07/93	08/08/93	10/31/93
Cutover Complete	10/05/93	08/10/93	08/10/93	11/02/93
Provisional Acceptance	10/13/93	09/18/93	09/18/93	11/10/93
Final Acceptance	11/12/94	09/17/94	09/17/94	12/10/94

The Teleconsult DSS Project Team consisted of Mr. M. Lee McDaniel who arrived in Cairo 15 November 1992 and Mr. Kenneth F. Fry who arrived in Cairo 24 January 1993. A local DSS Field Engineer, Mr. Ihab El Nagger, was added to the team in December 1992 and Mr. Khaled Rakha was added in early 1993. Mr. McDaniel, the lead Digital Switching Engineer,

and Mr. El Nagger were primarily responsible for the Opera and Ramsis exchanges and Mr. Fry and Mr. Rakha handled the Giza and Pyramid exchanges.

The following paragraphs will discuss each switch, the problems encountered and their solutions.

2.0 OPERA EXCHANGE - ATABA SQUARE

The Opera site is a predominantly business switch with several thousand residential customers. Like most ARENTO offices, it has two distinct business periods, one in the late morning and one in the early evening. Because of the business traffic in this switch, the busy hours and busy days are different than other offices. There is large demand for telephone service in this area. According to the latest available count at cutover, more than 9,000 people were waiting for a telephone. The waiting list included applications from as old as 1990.

The 20,000 line project (10,000 line addition and 10,000 line crossbar replacement) will probably last until the next project is completed during 1994. All known demand from earlier lists should be satisfied by this project.

2.1 Switch Characteristics

1. Size:
 - (a.) 20,000 Lines #5ESS
 - (b.) 53 Line Units (LU)
 - (c.) 13 Switch Modules (SM)
2. Concentration Ratio: 6:1
3. Outgoing Trunks: 1,380
4. Incoming Trunks: 1,280
5. Digital to Analog Converters: 120
6. Outgoing Traffic: 1,120 Erlang
7. Incoming Traffic: 1,080 Erlang
8. Call Rate/Subs-Outgoing: 0.056
9. Call Rate/Subs-Incoming: 0.054

2.2 Site Characteristics

- 2.2.1 **Site capacity:** Upon completion of the #5ESS, Opera should have had 30,000 lines of crossbar and 20,000 lines of #5ESS for a total site capacity of 50,000 lines. Due to the slow progress in transferring all of the selected crossbar numbers, more than 2,500 customers remained at Provisional Acceptance, adjusting the capacity to approximately 52,500. (Another USAID project during 1994 will increase the site capacity to 40,000 lines of #5ESS.)

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2.2.2 **Equipment Location:** The #5ESS is located on the 2nd floor and the auxiliary equipment is located through-out the complex. Substantial changes were needed to permit installation of the equipment.

Roughly 7,000 lines of Crossbar equipment was removed from the Opera I office to make room for the switch. The area was totally renovated and was ready to receive the equipment as scheduled.

A raised floor was installed for the ESS area to accommodate the 20,000 lines provided with this project. There is no room for expansion until additional crossbar equipment is removed from an adjacent area. This will allow room to expand the site to the full 60,000 lines of ESS as projected by ARENTO.

Unfortunately, the area for the ESS is where several vertical cable runs connect other crossbar offices to the MDF and where shielded cable runs connect transmission facilities to various areas within the site. Although AT&T dressed the vertical runs quite well, the under the floor arrangement cabling by ARENTO was less than the newly trained installers could have done. In addition to being something less than organized, the cables already block part of the DFI route to the fiber optics room. Future cable runs for Digital Facility Interface (DFI) equipment will be difficult to install. This was discussed with ARENTO several times, but they paid no attention to the problem because it was done by another work group.

The HVAC is located in the rear of the ESS equipment area is installed on the raised floor to allow underfloor air flow to the ESS frames. The condenser units for the HVAC are mounted outside the building on a make-shift platform that is very suspect when longevity is considered. The platform was reinforced as much as possible to correct several safety concerns but how long it will last is questionable. The two civil engineers that Bechtel Egypt loaned the DSS team to improve those situations with the platform and in the generator area, were very knowledgeable and easy to work with.

Batteries, Rectifiers and Power Bays are located in the crossbar power room on the ground floor. Even though old power equipment had to be removed, there were no appreciable delays with the room being ready for installation start.

The problems in this area were due to mounting exhaust fans in windows, finding a secure place for the safety wash station, and several vertical cable runs to the ESS area. Considerable effort was used to gain solutions to these problems.

2.2.3 **MDF:** Twenty verticals on the existing Ericsson MDF were used to terminate the 20,000 lines. The shelves on the MDF had been used to terminate the old crossbar equipment. After several discussions, ARENTO agreed that blocks and cable must be removed and they committed an unmanageable number of

technicians for the removal. Although delays to MDF cabling were avoided, the same can't be said for the daily service order work that was impacted. The MDF is located on the ground floor. This interference may have contributed to the less than cooperative spirit of the MDF crew during cutover and cutover preparations.

- 2.2.4 **Standby Power:** Three diesel generators with a total capacity of 1,200 KW were furnished. The generators were installed in new equipment bays on the ground floor. The control room for the generator system is also on the ground floor. Access to this area was extremely difficult and caused many serious discussions between ARENTO, AT&T, and OBI. Access was so dangerous that the job had to be stopped on one occasion to keep the AT&T sub-contractors (MANTRAC) from serious injury.
- 2.2.5 **Maintenance and Control Center (MCC):** Although very little space was allocated for the MCC, a compact but good arrangement was produced. Like all other MCCs, the organization of the center agreed to by the Planning Department had to be changed to please the Implementation Department. Ironically, the end user of the center, Operations & Maintenance, had no voice in either decision.
- 2.2.6 **Alterations:** Most alterations and modifications progressed as planned. ARENTO promised AT&T a building ready date of December 31, 1992. Although the building wasn't totally ready, AT&T accepted the building early on December 11, 1992 and started installation. Listed below are the areas of preparation that were not ready.
- **Equipment Entrance** - Opera was the only site with an equipment elevator and it didn't work when the job first started. After several attempts, ARENTO arranged to correct the problems and AT&T started using the elevator. Although the elevator problems caused some delays, they were insignificant compared to those caused by the unloading and uncrating areas which interfered with the movement of equipment. There was no space allocated to unload the equipment frames as trucks brought them from the warehouse. Several trucks would be waiting at once, severely affecting vehicle and pedestrian traffic. After the equipment was moved into the elevator, no space was provided to uncrate the frames except the hallway leading to the ESS area. This same hallway was shared by several offices and two rest rooms. This obviously created several traffic problems in the hallway and caused a number of arguments.
 - **Generator Area** - The generator installation wasn't started until several weeks after the switch and the alterations were not ready as promised. Several factors caused the delay.

The HVAC condenser platform caused several problems; approval of the muffler design was still pending; the decision to use a new fuel tank or the existing one

still undecided; and OBI refused to approve the sub-contract to MANTRAC for installation of the generators and control equipment. There was no direct access to unload the equipment and move it safely into the generator bays.

Although it took several weeks to sort out the problems and find solutions, it had only minimal impact upon the schedule. Since there was no power, all levels of testing were delayed for a few days but had no impact upon cut-over. Fortunately, ARENTO provided permanent AC Power for this location so there were no 11th hour power changes or testing crisis like those experienced at other sites.

The design for the fuel line from ARENTO's main tank to the day tanks took much longer than expected. After two attempts by MANTRAC, the Bechtel Egypt civil engineers offered suggestions that were acceptable to all parties and the fuel line was installed. Unfortunately, this was not the end of the problems because ARENTO forgot to order fuel (for an existing tank) and generator start up was several days later than expected.

Further, there were enormous disagreements within ARENTO about the design of the muffler supports and whether they should be vertical or horizontal. Again, the Bechtel Egypt civil engineers showed ways to correct some of the support problems with the vertical mounts and everyone was happy again.

Although there were other delays, none were as significant as those described above. Even with the problems outlined above, Opera was easily the second best organized of the four DSS sites.

2.2.7 *Outside Plant:* There was no outside plant involvement with this site.

2.3 MILESTONE EVENTS

Table O1 gives a summary of the contractual milestones required for the Opera site, the adjustments made through various agreements to those dates, and a comparison of the actual results to scheduled dates.

Even though there were several problems, the milestone dates for Opera were either met or surpassed as shown by the table.

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<i>MILESTONE</i>	<i>CONTRACT</i>	<i>ACTUAL</i>	<i>CHANGE</i>	<i>NOTES</i>
Effective Date of Contract	11/03/92	11/03/92	0	1
Equipment Shipped	11/25/92	11/18/92	+7	1
Customs Clearance	12/01/92	12/04/92	-3	1
Installation Start	01/30/93	12/11/92	+50	2
All Equipment of site	12/29/92	01/13/93	-15	2,3
Installation Testing Complete	07/28/93	N/A		4
Training Complete-Ph I	08/10/93	07/27/93	-	5
Training Complete-Ph II	1994	Unknown		5
24 Hour Load Test	07/25/93	07/21/93	+4	2,6
Pre-cutover Test Complete	07/25/93	07/22/93	+3	2,7
Cut-over Complete	08/10/93	07/22/93	+22	2,8
Cut-over Time	10:00pm	11:38pm	-98min	
Prov Accept Test Comp	09/05/93	08/26/93	+10	2,9
Prov Accept Cert Comp	11/02/93	09/28/93	+34	2,10
Final Accept Test Comp-	06/29/94	Unknown	?	2,11

Table O1 - Summary of Milestone Events

NOTES:

1. As listed in the AT&T CPM dated 12/12/92.
2. AT&T CPM dated 12/12/92 showed a 01/30/93 installation start. ARENTO unofficially requested a change to improve the cutover to June or July 1993. OBI and AT&T agreed and a start date of 12/11/92 was agreed.
3. AT&T CPM dated 12/12/92 showed a 02/29/92 all equipment on site date. ARENTO unofficially requested a change to improve the cutover to June or July 1993. OBI and AT&T agreed resulting in a start date of 12/29/92.
4. Milestone is meaningless and was not tracked. 24 hour load test is significant and was tracked very closely.
5. According to the contract, training was to complete prior to the first contractual cutover of 08/10/94. ARENTO requested deferral of the Advanced Training until 1994 and OBI and AT&T agreed. A date for the advanced training was unknown at the completion of Teleconsult's involvement.
6. AT&T CPM dated 12/12/92 showed a 07/25/93 load test date. ARENTO unofficially requested a change to improve the cutover to June or July 1993. ARENTO OBI and AT&T agreed resulting in a completion date of 07/25/93. Completed as scheduled with a 99.9945% success ratio. Requires 99.99% for test to

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- be successful.
7. AT&T CPM dated 12/12/92 showed a 07/30/93 pre-cutover test date. ARENTO unofficially requested a change to improve the cutover to June or July 1993. OBI and AT&T agreed resulting in a test complete date of 07/25/93.
 8. AT&T CPM dated 12/12/92 showed an 08/10/93 cutover date which did not include a transfer of lines. ARENTO unofficially requested a change to improve the cutover to June or July 1993. OBI and AT&T agreed resulting in a cutover date of 07/15/93 which ARENTO changed to 07/22/93 at the last minute. Several related completion dates had to be quickly adjusted because of the change. It was reported the change came from the Chairman, but the problems with the MDF can't be ignored either. According to ODD records, 5,306 Crossbar (91-000 thru 91-2999, 91-4000 thru 91-4999, and 91-5000 thru 91-9999) customers were transferred to the #5ESS at cutover. See later comments about quality of line transfer.
 9. AT&T CPM dated 12/12/92 showed a 09/18/93 completion date for Provisional Acceptance Testing. ARENTO unofficially requested a change to improve the cutover to June or July 1993. OBI and AT&T agreed resulting in a completion date of 09/05/93.
 10. AT&T CPM dated 12/12/92 did not include a milestone for the Provisional Acceptance Certificate. OBI insisted upon this milestone and AT&T and ARENTO agreed resulting in a completion date of 09/30/93.
 11. AT&T CPM dated 12/12/92 showed a 08/29/94 completion date for Final Acceptance Testing. ARENTO unofficially requested a change to improve the cutover to June or July 1993.. OBI and AT&T agreed resulting in a date of 06/29/94. This is beyond the coverage of the Teleconsult contract and no details are known about success or failure of this schedule.

2.4 CUTOVER AND POST CUTOVER SUMMARY

Grouped in Tables O2 through O5 is a summary of the information for the Opera #5ESS at cutover, three weeks after cutover, and after Provisional Acceptance. This includes information for Lines, Outside Plant (OSP), and Trunks (Transmission Facilities). This is an extract of the information sent to the Vice Chairman of Network Planning in two reports.

<i>CATEGORY</i>	<i>INSTALLED</i>	<i>AVAILABLE OR ASSIGNED</i>
#5ESS Lines	20,000	6,535
Cable Pairs	66,000	66,000
Trunks	2,670	1,110

Table O2 - Summary of Capacity through Provisional Acceptance

Crossbar customers with telephone numbers in nine of the ten thousands groups of the 91-0000 office code were included as a concurrent transfer with cutover. A summary of transfers is shown in Table O3 below. By contract, cutover did not include the transfer of any lines. AT&T agreed to help ARENTO with their transfers and OBI had no choice but do the same.

Cutover preparations and cutover were either the worst or next to worst of the four sites and were very disappointing. Cutover preparations were studied in detail so that the next cutover (Giza) could be better. In that respect, the cutover preparations were very beneficial.

2.4.1 *Lines:* An increase of 6,535 lines occurred after cutover, for an average of 934 lines per week. This was very good progress and the work was well ahead of the ambitious schedule established in the Utilization Plan. Almost 335 lines/week were necessary to complete the transfer and growth part of the plan by the end of June, 1994. The utilization plan was part of the USAID requirements added after the job was defined.

<i>TRANSFERRED</i>	<i>CUTOVER</i>	<i>THREE WEEKS</i>	<i>PROV ACCEPT</i>
591-0000 - 591-4999 (Did not include 91-3000 to 91-3999)	935	1,681	1,993
591-5000 - 591-9999	4,371	4,410	4,542
TOTAL	5,306	6,091	6,535

Table O3 - Transferred Lines

Transfer activities added the prefix "5" to each reassigned crossbar lines creating a seven digit number in the '591' code shown in Table O3 above. Very little imagination is needed to predict the problems associated with inter-office calling by looking at the working crossbar customers that were not transferred. Splitting the 591 code as they did was truly amazing and trunk group sampling clearly showed the problem. The problem was discussed with several within the ARENTO hierarchy but the solution rested with no one area of responsibility. It took several months to have the tandem switches re-programmed to permit this routing. Even after Provisional Acceptance, the 91 code was still partially active in all offices except the #5ESS and #1A sites which AT&T re-programmed to help protect those switches.

Growth for the #5ESS is shown in Table O4 below. The '571' office code is for regular subscribers and the '567' code is for DID customers. Note the addition of 1,542 new customers since cutover. This was an increase of 154 per week, which

was behind the schedule outlined in the Utilization Plan. The Utilization Plan which required 210 lines per week.

<i>GROWTH</i>	<i>CUTOVER</i>	<i>THREE WEEKS</i>	<i>PROV ACCEPT</i>
567-0000 - 567-9999	0	0	0
571-0000 - 571-9999	0	446	1,542
TOTAL	0	446	1,542

Table O4 - New Lines Assigned

2.4.2 *Outside Plant Pairs:* Table O5 suggests there will be some difficulty in utilizing the site switching capacity if the information regarding the available cable pairs is correct. Several people within ARENTO were very unhappy that OSP gave OBI the defective cable pair information for Giza and neither OBI or Teleconsult could obtain the same details for any other site. This condition did not seem to bother anyone except the DSS team and USAID. This condition also meant the utilization plan may have been partially based on false information since no office on earth has a perfect cable plant with zero defective pairs.

The number of Switch lines at cutover was 54,694. The Crossbar equipment (40,000) plus the 20,000 lines of #5ESS resulted in a possible total of 60,000 lines. Deduct the number of lines transferred (5,306) at cutover and the balance was 54,694. The number of lines at the site decreased as additional customers were transferred to the #5ESS and those crossbar lines were retired from service.

	<i>CUTOVER</i>	<i>3 WEEKS</i>	<i>PROV ACCEPT</i>
Cable Pairs	66,000	66,000	66,000
Switch Lines	54,694	53,909	52,539
OSP Pairs to Switch Lines	1.21	1.21	1.26

Table O5 - Switch Lines and Cable Pairs

2.4.3 *Trunk Circuits:* Listed below in Tables O6 and O7 is a comparison of trunk circuits at the three intervals and their status. Eighty-eight Digital Facility Interface (DFI) circuits were installed as part of the contract, resulting in 2,640 trunks. A transfer of five DFIs (150 circuits) from the Pyramid spare equipment during November, 1993 increased the trunks to 2,740.

<i>TRUNK CIRCUITS</i>	<i>CUTOVER</i>	<i>THREE WEEKS</i>	<i>PROV ACCEPT</i>
Required	2,670	2,670	2,670
Installed	2,640	2,670	2,670
In software	2,640	2,670	2,670
Activated	1,050	1,050	1,110
Ratio	39%	39%	42%

Table O6 - Trunk Circuits Installed vs In-service

Even though all of the hardware and software assignments were installed by Provisional Acceptance, only 42% were active. These problems were a direct result of connecting offices not having sufficient terminations, adequate transmission facilities, or incorrect software to match the Opera end. This is demonstrated further by Table O7 which reviews the status of trunk groups.

<i>TRUNK GROUPS</i>	<i>CUTOVER</i>	<i>THREE WEEKS</i>	<i>PROV ACCEPT</i>
Installed	32	32	32
Active	6	6	8
Ratio	19%	19%	25%

Table O7 - Trunk Groups Installed vs Active

An installed trunk group means that the hardware units (DFI's) are installed, the ODD (Office Dependant Database) includes the trunk group number and member information, and the assigned DFI's are cabled to the appropriate fiber optic distributing frame. In essence, everything is done at the #5ESS location to cause trunking and the problem is elsewhere.

Upon completion of Provisional Acceptance, only 25% of the trunk groups and only 42% of the trunk units were active to support 38% of the in-service lines. This was reasonably adequate until several thousand more lines were added when trunking congestion became frequent.

This was very obvious when the COM Center became operational in March 1994 and busy hour trunking showed completion rates in the low 30% range. These results are typical of all four offices except Ramsis which was much better in every respect dealing with trunking.

2.5 SUMMARY:

Even though Opera was a relatively well organized and prepared site, there were still several problems that were successfully addressed which allowed the switch to proceed to a "ready for cutover" state. As shown by the trunking statistics, the same was not true of the network. It is difficult to determine if Opera was the worst or next worst cut-over of the four sites. The network and MDF preparations were at best, very poor. The good that came from this cutover allowed the DSS team to concentrate upon network preparations and MDF activities at the Giza site in hopes of showing ARENTO how to improve their techniques.

An attempt was made to sample complaints and troubles for the five days immediately after cutover but that failed because ARENTO had far too many irate customers to concern themselves with inquiries from the DSS team. For several weeks after cutover, there were long lines of customers at the MDF room and the DSS door angrily complaining about out-of-service lines, can't-call-their-neighbors, or can't-be-called because no one knows their new number. Even physicians and at least one hospital were affected. In essence, the network preparations were a severe disappointment because no matter how much prodding by the DSS team, Opera was going to cutover like always. Regretfully, this overshadowed a lot of good work that preceded the cutover.

This material is not intended to embarrass ARENTO because they cannot be expected to understand that telephone customers in North America do not tolerate this kind of cutover and subsequent service. Consequently, Utility Regulators in North American are very likely to punish a telephone company for this kind of cutover. Even more important, there is no good reason why USAID should be a party to such a fiasco. Finally, ARENTO's customers should expect far more than just dial tone because there are many good people within ARENTO that can do more. Hopefully, these comments will assist management in realizing these short-comings and in taking positive steps for improvement.

3.0 GIZA EXCHANGE - GIZA SQUARE

The Giza exchange is a mixed business/residence switch. Like most ARENTO offices, it has two distinct business periods, one in the late morning and one in the early evening. There is a very large demand for telephone service in this area. According to the latest available count at cutover, 17,000 people were waiting for a telephone. The list included applications from as old as 1987.

The 20,000 line project (10,000 line addition and 10,000 line crossbar replacement) will probably not last more than 12 months after cutover and still will not satisfy all of the demand.

3.1 Switch Characteristics

1. Size:
 - (a.) 24,000 Lines #5ESS (20,000 New Lines, 4,000 Lines from existing RSM)
 - (b.) 56 Line Units (LU)
 - (c.) 13 Switch Modules (SM)
2. Concentration Ratio: 8:1
3. Outgoing Trunks: 1,410
4. Incoming Trunks: 1,350
5. Digital to Analog Converters: 120
6. Outgoing Traffic: 1,224 Erlang
7. Incoming Traffic: 1,176 Erlang
8. Call Rate/Subs-Outgoing: 0.051
9. Call Rate/Subs-Incoming: 0.049

3.2 Site Characteristics

3.2.1 **Site capacity:** Upon completion of the #5ESS, Giza had 20,000 lines of crossbar and 24,000 lines of #5ESS for a total site capacity of 44,000 lines. (A Commodity Import Program, AID Grant No. 263-K-624, during 1994 increased the site capacity to 34,000 lines of #5ESS.)

3.2.2 **Equipment Location:** The #5ESS and all auxiliary equipment is located on the 5th floor. Only minimal changes were needed to permit installation of the equipment. A raised floor was installed for the ESS area to accommodate approximately 40,000 lines, with room to expand the area and raised floor to 60,000 lines.

The HVAC is also located on the 5th floor, immediately adjacent to the Maintenance Control Center (MCC). The HVAC is installed on raised floor to allow underfloor air flow to the ESS frames.

Batteries, Rectifiers and Power Bays are located in the new power room on the 5th floor, adjacent to the HVAC.

- 3.2.3 **MDF:** Twenty-two verticals on the existing Ericsson MDF were used to terminate the 24,000 lines. The MDF is located on the ground floor. Protector modules were incorrectly ordered by ARENTO and had to be transferred to another site.
- 3.2.4 **Standby Power:** Three diesel generators with a total capacity of 585 KW were furnished. The generators were installed in new equipment bays on the ground floor. The control room for the generator system is on the ground floor. Access to this area was extremely difficult.
- 3.2.5 **Alterations:** Most alterations and modifications progressed as planned. ARENTO promised AT&T a building ready date of December 30, 1992. Although the building wasn't totally ready, AT&T accepted the building on December 18, 1992 and started installation. Listed below are the areas of preparation that were not ready.
- **Equipment Entrance:** An outside hoisting arrangement was used by AT&T to lift the equipment frames to the fifth floor. The frames were left in the shipping container to help protect the equipment during hoisting. No equipment was damaged during this process which is absolutely unbelievable because the area outside the building used to unload and hoist the equipment was very unsafe. This area had as much as 2" of overflow sewage from the Giza Exchange which caused a serious hazard. Although this was discussed many times with ARENTO, nothing was done to eliminate the problem. Consequently, the AT&T installers used extreme caution during the entire hoisting process and miraculously, there was no damage to any hoisted equipment.
 - **Generator Area:** The generator installation wasn't started until several weeks after the switch and the alterations were not ready as promised. Several factors caused the delay. The transmission engineers did not know that generator bays were being installed and erected a tower base for a new radio directly in front of two generator bays, completely blocking access to these bays.

Several weeks were wasted while ARENTO tried to sort out the problems and find a solution. There was no direct access to unload the equipment and move it safely into the generator bays. Arrangements had to be made

with a private school next to the exchange to park a hoist and several trucks. The hoist lifted the generators from the truck, over a two meter fence, and sat them just inside the fence. They were then manhandled onto the mounting pads.

ARENTO agreed to have permanent power for the generator control room at the time of installation start. Instead, a temporary breaker was provided several weeks later than expected. Consequently, on the night before cutover, the final power was installed and the last step of pre-cutover testing was completed.

The design for the fuel line from the main tank to the three day tanks took much longer than expected. After several discussions, ARENTO constructed a device incapable of supporting the weight of overhead fuel lines. Several weeks later, AT&T gave in to ARENTO and erected a well designed and constructed overhead assembly.

During the prefielding phase of the contract, AT&T requested twenty-two uprights on the MDF to terminate the DSS. ARENTO's Planning Dept agreed and the cable engineering was completed. No one told the transmission engineers and they assumed control over two horizontal shelves in an area that almost ruined all of the cable engineering. After several attempts to have the transmission engineers remove their blocks, AT&T changed the blocks for ARENTO to avoid further delays.

Although there were other delays, none were as significant as those described above. Even with the problems outlined above, Giza was by far the best designed and organized of the four DSS sites.

- 3.2.6 **Outside Plant:** Twenty-two new feeder cable of 2400 pairs each will be added by RFQ 07/92/30. The project is to provide OSP growth to relieve most of the 17,000 requests for telephone service after the OSP and Commodity Import Project complete during 1994 and 1995. Certificate of Provisional Acceptance for the OSP is unknown but is expected during May, 1995.

Outside Plant was not part of the DSS Project but could impact the use of the #5ESS lines. See Table G for additional information.

3.3 Milestone Events

Table G1 gives a summary of the contractual milestones required for the Giza, the adjustments made through various agreements to those dates, and a comparison of the actual results to scheduled dates.

Even though there were many problems, and most of them unnecessary, the meeting of milestone dates for the Giza site was very good.

MILESTONE	CONTRACT	ACTUAL	CHANGE	NOTES
Effective Date of Contract	11/03/92	11/03/92	0	1
Equipment Shipped	11/15/92	11/15/92	0	1
Customs Clearance	12/13/92	12/10/92	+5	1
Installation Start	12/18/92	12/18/92	0	2
All Equipment of site	12/18/92	12/18/92	0	2,3
Installation Testing Complete	08/23/93	N/A		4
Training Complete-Ph I	08/10/93	07/27/93	-	5
Training Complete-Ph II	1994	Unknown		5
24 Hour Load Test	07/25/93	07/25/93	0	2,6
Pre-cutover Test Complete	08/04/93	08/04/93	0	2,7
Cut-over (20K Host) Complete	08/10/93	08/06/93	+4	2,8
Cut-over Time	12:00am	00:23am	-23min	
Prov Accept Test Comp-(20K Host)	09/26/93	09/12/93	+14	2,9
Prov Accept Test Comp- (4K RSM)	10/16/93	10/04/93	+11	2,10
Prov Accept Cert Comp- (20K Host)	11/02/93	11/01/93	+1	2,11
Prov Accept Cert Comp- (4K RSM)	11/30/93	11/06/93	+24	2,12
Final Accept Test Comp-(20K Host)	09/12/94	Unknown	?	2,13
Final Accept Test Comp-(4K RSM)	11/06/94	Unknown	?	2,14

Table G1 - Summary of Milestone Events

NOTES:

1. As listed in the AT&T CPM dated 12/12/92.
2. AT&T CPM dated 12/12/92 showed a 02/23/93 installation start. ARENTO

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- requested a change to make Giza a 40 week schedule instead of Ramsis. OBI and AT&T agreed and a start date of 12/18/92 was agreed.
3. AT&T CPM dated 12/12/92 showed a 03/01/93 all equipment on site date. ARENTO requested a change to make Giza a 40 week schedule instead of Ramsis. OBI and AT&T agreed resulting in a start date of 12/18/92.
 4. Milestone is meaningless and was not tracked. 24 hour load test is significant and was tracked very closely.
 5. According to the contract, training was to complete prior to the first contractual cutover of 08/10/94 (Opera). ARENTO requested deferral of the Advanced Training until 1994 and OBI and AT&T agreed. A date for the advanced training was unknown at the completion of Teleconsult's involvement.
 6. AT&T CPM dated 12/12/92 showed a 09/25/93 load test date. ARENTO requested a change to make Giza a 40 week schedule instead of Ramsis. OBI and AT&T agreed resulting in a completion date of 07/25/93. Completed as scheduled with a 99.9972% success ratio. Requires 99.99% for test to be successful.
 7. AT&T CPM dated 12/12/92 showed a 10/04/93 pre-cutover test date. ARENTO requested a change to make Giza a 40 week schedule instead of Ramsis. OBI and AT&T agreed resulting in a test complete date of 07/28/93 which ARENTO changed to 08/04/93 at the last minute.
 8. AT&T CPM dated 12/12/92 showed a 10/05/93 cutover date which did not include a transfer of lines. ARENTO requested a change to make Giza a 40 week schedule instead of Ramsis. OBI and AT&T agreed resulting in a cutover date of 08/10/93 which ARENTO requested an improvement to 07/29/93 and changed to 08/05/93 at the last minute. According to ODD records, 1,859 Crossbar (572-XXXX) customers and 3,480 RSM (570-0XXX thru 3XXX) customers were transferred to the #5ESS at cutover. See later comments about quality of line transfer.
 9. AT&T CPM dated 12/12/92 showed a 10/13/93 completion date for Provisional Acceptance Testing. ARENTO requested a change to make Giza a 40 week schedule instead of Ramsis. OBI and AT&T agreed resulting in a cutover date of 09/26/93.
 10. AT&T CPM dated 12/12/92 was based upon a 12 week interval between cutover of the 20K host switch and the 4K RSM and showed a 01/05/94 completion date for Provisional Acceptance Testing. OBI insisted that Giza was a 10 week interval AT&T agreed resulting in a completion date of 10/16/93.
 11. AT&T CPM dated 12/12/92 did not include a milestone for the Provisional Acceptance Certificate. OBI insisted upon this milestone and AT&T and ARENTO agreed resulting in a completion date of 09/26/93 for the 20K host switch.
 12. AT&T CPM dated 12/12/92 did not include a milestone for the Provisional Acceptance Certificate. OBI insisted upon this milestone and AT&T and ARENTO agreed resulting in a completion date of 11/02/93 for the 4K RSM relocation.
 13. AT&T CPM dated 12/12/92 showed a 11/12/94 completion date for Final Acceptance Testing for the 20K host switch. ARENTO requested a change to make Giza a 40 week schedule instead of Ramsis. OBI and AT&T agreed resulting in a date of 09/12/93. This is beyond the coverage of the Teleconsult contract and no details are known about success or failure of this schedule.
 14. AT&T CPM dated 12/12/92 showed a 02/27/95 completion date for Final Acceptance Testing for the 4K RSM relocation. ARENTO requested a change to make Giza a 40 week schedule instead of Ramsis. OBI and AT&T agreed resulting

in a date of 11/06/94. This is beyond the coverage of the Teleconsult contract and no details are known about success or failure of this schedule.

3.4 CUTOVER AND POST CUTOVER SUMMARY

Tables G2 through G5 are a summary of the information for the Giza #5ESS at cutover, three weeks after cutover, and after Provisional Acceptance. This includes information for Lines, Outside Plant (OSP), and Trunks (Transmission Facilities). This is an extract of the information sent to the Vice Chairman of Network Planning in two reports.

<i>CATEGORY</i>	<i>INSTALLED</i>	<i>AVAILABLE OR ASSIGNED</i>
#5ESS Lines	24,000*	9,590
Cable Pairs	48,400**	33,812
Trunks	2,760	1,560

Table G2 - Summary of Capacity through Provisional Acceptance

* The Giza #5ESS cutover with 20,000 installed lines. In less than seven weeks, the 4,000 RSM lines were relocated to the host switch on September 29, 1993, increasing the #5ESS capacity to 24,000 lines.

** The available cable pair count was revised to reflect new information received from the Zone.

Cutover included the simultaneous transfer of the Giza RSM customers with telephone numbers between 570-0000 and 570-3999. Crossbar customers with telephone numbers between 72-0000 and 72-1999 were also included in the concurrent transfer. A summary of transfers is shown in Table G3 below. By contract, cutover did not include the transfer of any lines. AT&T agreed to help ARENTO with their transfers and OBI had no choice but do the same.

Although cutover preparations and cutover were much better than Opera, it was still very disappointing. Cutover preparations were studied in detail so that the next cutover (Ramsis) would be much better. In that respect, the cutover preparations were very beneficial.

3.4.1 Lines: An increase of 7,529 lines occurred after cutover, for an average of 753 lines per week. Although this was very good progress, the work was still well behind the ambitious schedule established in the Utilization Plan. Almost 1500 lines/week were necessary to complete the transfer and growth part of the plan by

the end of September. The utilization plan was part of the USAID requirements added after the job was defined.

<i>TRANSFERRED</i>	<i>CUTOVER</i>	<i>THREE WEEKS</i>	<i>PROV ACCEPT</i>
570-0000 - 570-9999	3,480	3,568	3,550
572-0000 - 572-1999	1,859	1,859	1,859
572-6000 - 572-9999	-0-	2,346	3,731
573-5000 - 573-8999	-0-	-0-	3,728
TOTAL	5,339	5,914	12,868

Table G3 - Transferred Lines

Transfer activities added the prefix "5" to each reassigned crossbar lines creating a seven digit number in the '572' and '573' office codes shown in Table G3 above. Very little imagination is needed to predict the problems associated with inter-office calling by looking at the working crossbar customers that were not transferred. It took several weeks to have the tandem switches re-programmed to permit this routing.

Growth for the #5ESS is shown in Table G4 below. The '571' office code is for regular subscribers and the '567' code is for DID customers. Note the addition of 1,542 new customers since cutover. This was an increase of 154 per week, also behind the schedule outlined in the Utilization Plan, which required 210 lines per week.

<i>GROWTH</i>	<i>CUTOVER</i>	<i>THREE WEEKS</i>	<i>PROV ACCEPT</i>
567-0000 - 567-9999	0	0	0
571-0000 - 571-9999	0	446	1,542
TOTAL	0	446	1,542

Table G4 - New Lines Assigned

3.4.2 Outside Plant Pairs: Table G5 shows the difficulty in utilizing the site switching capacity because of available cable pairs. Until additional cable pairs are added or repaired, or additional crossbar is removed, the switch is likely to remain under utilized. This condition did not seem to bother anyone except the DSS team and USAID. This condition also meant the utilization plan was based in part on false information since there were not enough available cable pairs to implement the

plan.

Several people within ARENTO were very unhappy that OSP gave OBI the defective cable pair information just before Provisional Acceptance Testing. They were so unhappy that neither OBI or Teleconsult could obtain the information for any other site. Numbers were given in some cases but when an attempt was made to verify the accuracy, the numbers proved invalid.

The number of Switch lines at cutover was 48,661. The Crossbar equipment (30,000) plus the 24,000 lines of #5ESS results in a total of 54,000 lines. Deduct the number of lines transferred (5,339) at cutover and the balance was 48,661. The number of lines at the site decreased as additional crossbar customers were transferred to the #5ESS and the crossbar lines were retired from service.

	<i>CUTOVER</i>	<i>3 WEEKS</i>	<i>PROV ACCEPT</i>
Cable Pairs	48,400	48,400	33,812
Switch Lines	48,661	48,086	44,682
OSP Pairs to Switch Lines	0.99	1.01	<i>0.77</i>

Table G5 - Switch Lines and Cable Pairs

3.4.3 Trunk Circuits: Listed below in Tables G6 and G7 is a comparison of trunk circuits at the three intervals and their status. Ninety-three Digital Facility Interface (DFI) circuits were installed as part of the contract, resulting in 2,790 trunks. A transfer of three DFIs (90 circuits) from the Pyramid spare equipment during November, 1993 increased the trunks to 2,880.

<i>TRUNK CIRCUITS</i>	<i>CUTOVER</i>	<i>THREE WEEKS</i>	<i>PROV ACCEPT</i>
Required	2,790	2,790	2,880
Installed	2,790	2,790	2,790
In software	2,760	2,760	2,760
Activated	900	1,050	1,560
Ratio	32%	38%	54%

Table G6 - Trunk Circuits Installed vs In-service

Even though all of the hardware and more than 98% of the software assignments were installed by Provisional Acceptance, only 54% were active. These problems were a direct result of connecting offices not having sufficient terminations, adequate transmission facilities, or incorrect software to match the Giza end. This is demonstrated further by Table G7 which reviews the status of trunk groups.

<i>TRUNK GROUPS</i>	<i>CUTOVER</i>	<i>THREE WEEKS</i>	<i>PROV ACCEPT</i>
Installed	28	28	28
Active	5	8	8
Ratio	18%	29%	29%

Table G7 - Trunk Groups Installed vs Active

An installed trunk group means that the hardware units (DFI's) are installed, the ODD (Office Dependant Database) includes the trunk group number and member information, the assigned DFI's are cabled to the appropriate fiber optic distributing frame. In essence, everything is done at the #5ESS location to cause trunking and the problem is elsewhere.

Upon completion of Provisional Acceptance, only 29% of the trunk groups and only 54% of the trunk units were active even though 60% of the lines were assigned and in-use. This was very obvious when the COM Center became operational and busy hour trunking showed completion rates in the low 30% range.

These results are typical of all four offices except Ramsis which was much better in every respect.

3.5 SUMMARY:

Even though Giza was the best organized and prepared site, there were still problems that were successfully addressed and allowed the switch to proceed to a "ready for cutover" state. As shown by the trunking statistics, the same was not true of the network. Further, if complaints and troubles were available for the five days immediately after cutover, the numbers of line troubles would match the long lines of customers complaining about out-of-service lines, can-no-longer-call their neighbors, can't-be-called because no one knows their new number. In essence, the network preparations were woefully lacking no matter how much prodding by the DSS team. This overshadowed the good work that preceded the cutover.

4.0 RAMSIS EXCHANGE - RAMSIS SQUARE

The Ramsis site is the largest business switch in Cairo. It also has several thousand residential customers. Like most ARENTO offices, it has two distinct business periods, one in the late morning and one in the early evening. Because of the business traffic in this switch, the busy hours and busy days are different than other offices. Since there is an abundance of both Coptic and Muslim store owners in this district and neither Friday, Saturday, or Sunday are light traffic periods compared to other business areas. For these reasons, the traffic data being exactly the same as Opera is very suspect.

There is a large demand for telephone service in this area. According to the latest available count at cutover, more than 9,000 people were waiting for a telephone. The waiting list included applications from as old as 1990.

The 20,000 line project (7,000 line addition and 13,000 line crossbar replacement) may not last until the next project is completed during 1994. All known demand from earlier lists should be satisfied by the next project.

Ramsis is a unique site. Although similar to other switches in many respects, it is very different in one aspect; that is its physical location. It is located on the same property as the ARENTO executive staff. Its location is also in an area where ARENTO's image suffers periodically with neighborhood newspapers who do not accept their proclaimed self image. The simultaneous transfer of 13,000 numbers frightened a number of the ARENTO executives because of Opera and even Giza. Consequently, their staff was very willing to listen to recommendations that would improve the cutover of such a large number of important customers. Ramsis was the only site where ARENTO readily accepted the advice of the DSS team. After Ramsis, everything reverted to normal.

4.1 Switch Characteristics

1. Size:
 - (a.) 20,000 Lines #5ESS
 - (b.) 53 Line Units (LU)
 - (c.) 13 Switch Modules (SM)
2. Concentration Ratio: 6:1
3. Outgoing Trunks: 1,410
4. Incoming Trunks: 1,380
5. Digital to Analog Converters: 120
6. Outgoing Traffic: 1,120 Erlang
7. Incoming Traffic: 1,080 Erlang
8. Call Rate/Subs-Outgoing: 0.056
9. Call Rate/Subs-Incoming: 0.054

4

4.2 Site Characteristics

- 4.2.1 **Site capacity:** Upon completion of the #5ESS, Ramsis should have had 30,000 lines of crossbar, 20,000 lines of #5ESS, and 7,000 lines of NEC for a total site capacity of 57,000 lines. (Another USAID project during 1994 will increase the site capacity to 40,000 lines of #5ESS.)
- 4.2.2 **Equipment Location:** The #5ESS is located on the 5th floor of the equipment building and the auxiliary equipment is located through-out the complex. Substantial changes were needed to permit installation of the equipment.

Roughly 7,000 lines of Crossbar equipment were removed from the Ramsis I office to make room for the switch. The ESS area was totally renovated and was ready to receive the equipment on February 15, 1993, five weeks later than planned. This did not include the generator area, the equipment hoisting arrangement, or the infamous cable route to the AC supply.

A raised floor was installed for the ESS area to accommodate the 20,000 lines provided with this project. There is no room for expansion until additional crossbar equipment is removed from an adjacent area. This will allow room to expand the site to the full 60,000 lines of ESS as projected by ARENTO.

Unfortunately, the area for the ESS is above the crossbar and AXE10 floors with several dozen horizontal cable runs to the MDF and transmission cables to various areas within the site. Although AT&T and the ARENTO Planning Department agreed upon a cable route for power and to the MDF, the Siemens AXE10 addition completely blocked both routes. It took almost one month to obtain ARENTO's agreements on a route to the MDF and even longer for the power cable. The route to the MDF was horrible and required almost 50% more installation time than was planned. The routes to the various transmission areas, to include future cable runs, for Digital Facility Interface (DFI) equipment were comparatively easy to gain approval and install.

The HVAC is located on the fifth floor near the ESS equipment area and is also installed on the raised floor to allow underfloor air flow to the ESS frames. The condenser units for the HVAC are mounted inside the building on a make-shift platform that is a most ingenious device. The platform is build from reinforced steel and mounts one condenser above the other. It is stressed for more than twice the weight of both condenser units. These units are mounted inside the building because AT&T and ARENTO could never agree upon an area outside the building.

Batteries, Rectifiers and Power Bays are located in the new power room, also on the fifth floor. Even though old spare equipment and an accumulation of surplus

materials had to be removed, there were no appreciable delays with the room being ready for installation start. Although the room is crowded, removal of crossbar equipment in an adjacent area provides ample room for expansion.

The problems in this area were due to mounting exhaust fans through the walls (instead of a split AC unit), finding an adequate route for the DC cables to the generator building, and several cable runs of shielded cable from the ESS area to the various transmission areas. Considerable effort was used to gain solutions to these problems.

MDF: Twenty verticals were added to the growth end of the existing Ericsson MDF to terminate the 20,000 lines. Several people within ARENTO's Planning Department insisted that the existing shelves on the MDF should be used to terminate the ESS equipment. After many discussions, ARENTO finally agreed to an extension and the MDF was started with only a minor delay. The MDF is located on the ground floor.

Although this is a very long and complicated MDF, it was managed by a very good crew interested in doing the best job they could. Their cooperative spirit contributed substantially to the success at Ramsis during cutover and cutover preparations.

Standby Power: Two diesel generators with a total capacity of 800 KW were furnished. The generators were installed in new equipment bays on the ground floor. The control room for the generator system is also on the ground floor. This was an old storage area that had not been touched for years and had to be totally renovated. Cable access to this area was extremely difficult and caused many serious discussions between ARENTO, AT&T, and OBI.

Although this was discussed in over twenty weekly meetings, and eight separate work sessions, ARENTO would not make a decision or agree to any of the proposals offered by AT&T and OBI. It was not until May 24, 1993 when AT&T stated that if the cable access wasn't completed by Jul 6, 1993 the switch would not cutover as planned on November 2, 1993. Only then did ARENTO become serious and make a decision. In fact they made seven decisions in less than three days and nobody knew what anyone wanted.

The absence of a decision and then too many decisions caused over three weeks delay. The route was so long and complicated to both the AC distribution fuse and the -48vdc plant that another two weeks were lost.

Maintenance and Control Center (MCC): Although the MCC was almost an after thought and very little space was allocated, a compact but good arrangement was produced. Like all other MCCs, the organization of the center agreed to by

the Planning Department had to be changed to please the Implementation Department. In this case it was so small they had almost no options to change, but they made changes anyway. Ironically, this switch was tested in the hottest part of the summer and it was the only MCC without air conditioning. As shown later in this annex, it had the best test results of any site for the 24 hour run.

- 4.2.3 **Alterations:** Most alterations and modifications progressed as planned. ARENTO promised AT&T a building ready date of January 31, 1993 and didn't meet the commitment. Although the site wasn't totally ready, AT&T accepted the building early on March 15, 1993 but they did not start installation until March 27, 1993, soon after the equipment hoist was certified. Listed below are the areas of preparation that presented many problems.

Equipment Entrance - Ramsis was the only site without an equipment elevator or any visible means to hoisting equipment into the building. No less than six attempts were tried jointly between ARENTO, AT&T, and OBI before a solution was proposed. Although the solution would never be accepted in the United States, it worked fine in Egypt. The Men's WC (toilet) was selected as the entry point and approved by all concerned (by some with just a little uneasiness). Once the decision was made, it didn't take too long to get the work completed. There were several mistakes made but none of them had anything to do with safety or building structure. The lifting capacity of the outside hoisting bar was finally certified by ARENTO on March 18, 1993 that it could raise one metric ton.

Generator Area - The generator installation wasn't started until several weeks after the switch and the alterations were not ready as promised. Several factors caused the delay.

- The location of the fuel tank and the design for the fuel line from the tank to the day tanks took much longer than expected. Several attempts were needed before a suggested location was agreeable to all concerned. Remember, this is Ramsis, where nearly all the executives have their offices. Pleasing one area does not guarantee approval by another, especially where everyone could walk over and add another idea or so to research. Generator start up was several days later than expected.
- The AC distribution agreed to by AT&T and the ARENTO Planning Department was incorrect and could not be implemented. Gaining an alternative was one of the most exhausting experiences the DSS team encountered. After several false starts, dozens of broken promises, and frequent adjustments along the way; a route was selected, a design was conceived, and construction completed. Unfortunately, five weeks were lost and AT&T wrote their infamous letter of July 21, 1993 asking for a three week delay in contractual cutover. After careful review, the DSS

team concurred with the request and recommended that ARENTO approve the change. Finally, after several days of serious lobbying, ARENTO agreed but they were still seriously offended. OBI didn't approve the letter until December, 1993 over a month after cutover.

4.2.4 *Other Delays:*

DFI CABLING: Cable routes and terminations for the DFIs (Digital Facility Interface or Trunks) were a significant problem. Unlike other sites where all DFI cables terminated on the same DDF (or a similar digital cross connect frame), Ramsis had six locations depending upon where the trunk group went and the age of the equipment used.

One set terminated on one AXE10 for International and National calls, another on the AXE10 for the Ramsis Tandem, another to cross connect to the Digital to Analog converters to trunk to the crossbar offices, and three within the transmission room.

None of these frames accepted the AT&T connector so another big debate about who would pay for the 120 Seimens and 28 Erickson connectors needed. That went on for several weeks (but AT&T worked through the debate) until ARENTO agreed to pay.

Within thirty minutes, the decision was reversed and OBI agreed with ARENTO without consulting the DSS Team for advice. In the eyes of OBI, AT&T was incorrect and must pay for the connectors. AT&T was furious with the decision.

Jumper Wire: Fate could not have planned a worse site to have problems with the shipment of jumper wire. Although the wire should have been cleared through customs during August 1993, it did not arrive on site until September 24, 1993. Using the data developed at Giza, ARENTO needed 13 weeks to prepare the MDF for cutover. That meant a start date of August 24, 1993. To compensate for lack of jumper wire, boxes of spare wire were loaned from Opera, Giza, and Alexandria to last until the shipment cleared customs. Although this is contrary to ARENTO policy, it was a satisfactory solution and worked until the jumper wire arrived. This probably would not have been acceptable at any other site because there was not the same interest in a successful cutover.

Although there were other delays, none were as significant as those described above.

4.2.7 *Outside Plant:* There was no outside plant involvement with this site.

4.3 MILESTONE EVENTS

Table R1 gives a summary of the contractual milestones required for the Ramsis site, the adjustments made through various agreements to those dates, and a comparison of the actual results to scheduled dates.

As shown in the preceding pages, Ramsis had several serious problems. At one point in July 1993 the job was six weeks behind schedule, yet Ramsis was by far the best cutover and missed the contract date by only eight days, not three weeks.

<i>MILESTONE</i>	<i>CONTRACT</i>	<i>ACTUAL</i>	<i>CHANGE</i>	<i>NOTES</i>
Effective Date of Contract	11/03/92	11/03/92	0	1
Equipment Shipped	12/24/92	12/18/92	+7	1
Customs Clearance	01/15/93	01/04/92	+11	1
Installation Start	05/02/93	03/27/93	+36	2
All Equipment of site	05/02/92	03/22/93	+40	2,3
Installation Testing Complete	09/17/93	N/A		4
Training Complete-Ph I	08/10/93	07/22/93	-	5
Training Complete-Ph II	1994	Unknown		5
24 Hour Load Test	10/12/93	10/12/93	0	2,6
Pre-cutover Test Complete	11/11/93	11/10/93	+1	2,7
Cut-over Complete	11/23/93	11/12/93	+11	2,8
Cut-over Time	00:00am	00:07pm	-7min	
Prov Accept Test Comp	12/18/93	12/15/93	+3	2,9
Prov Accept Cert Comp	12/31/93	12/18/93	+13	2,10
Final Accept Test Comp-	11/17/94	Unknown	?	2,11

Table R1 - Summary of Milestone Events

NOTES:

1. As listed in the AT&T CPM dated 12/12/92.
2. AT&T CPM dated 12/12/92 showed a 02/13/93 installation start. ARENTO officially requested a change to exchange schedules for Giza and Ramsis because the Ramsis site was not ready. OBI and AT&T agreed and a start date of 02/13/92 was agreed. However, since the building was not ready until March 6 and the

- equipment hoist was not certified until March 18, 1993 the start date was adjusted again.
3. AT&T CPM dated 12/12/92 showed a 03/019/92 all equipment on site date. ARENTO officially requested a change to exchange schedules for Giza and Ramsis because the Ramsis site was not ready. OBI and AT&T agreed and the all equipment of site date of 0/01/92 was established. However, since the building was not ready until March 6 and the equipment hoist was not certified until March 18, 1993 the start date was adjusted again.
 4. Milestone is meaningless and was not tracked. 24 hour load test is significant and was tracked very closely.
 5. According to the contract, training was to complete prior to the first contractual cutover of 08/10/94. ARENTO requested deferral of the Advanced Training until 1994 and OBI and AT&T agreed. A date for the advanced training was unknown at the completion of Teleconsult's involvement.
 6. AT&T CPM dated 12/12/92 showed a 10/30/93 load test date. Because of the changed start date, OBI and AT&T agreed to a 10/21/93 load test date. Due to the delays in the AC/DC Power systems, the DSS Team and AT&T agreed to an 11/20/93 completion date. ARENTO then changed the cutover date and the schedule was adjusted again 10/23/93. Completed on 10/23/93 with a 99.9996% success ratio. Requires 99.99% for test to be successful.
 7. AT&T CPM dated 12/12/92 showed a 10/23/93 pre-cutover test date. Because of the changed start date, OBI and AT&T agreed to a 10/30/93 completion date. Due to the delays in the AC/DC Power systems, the DSS Team and AT&T agreed to an 11/21/93 completion date. ARENTO then changed the cutover date and the schedule was adjusted again 11/1/93. Completed on 11/11/93 with the best network preparations of any site.
 8. AT&T CPM dated 12/12/92 showed a 08/10/93 cutover date which did not include a transfer of lines. When ARENTO exchanged the schedules for Giza and Ramsis, AT&T and OBI agreed to a cutover date of 11/02/93. Even with the changed start date, OBI and AT&T maintained the 11/02/93 cutover date. However, due to the delays in the AC/DC Power systems, the DSS Team and AT&T agreed to an 11/23/93 cutover date which ARENTO later changed to 11/12/93. According to ODD records, 11,977 Crossbar (75-0000 thru 75-9999, and 74-7000 thru 74-9999) customers were transferred to the #5ESS at cutover. See later comments about quality of line transfer.
 9. AT&T CPM dated 12/12/92 showed a 09/18/93 completion date for Provisional Acceptance Testing. Because of all the changes in dates, OBI and AT&T agreed resulting in a completion date of 12/18/93.
 10. AT&T CPM dated 12/12/92 did not include a milestone for the Provisional Acceptance Certificate. OBI insisted upon this milestone and AT&T and ARENTO agreed resulting in a completion date of 12/31/93.
 11. AT&T CPM dated 12/12/92 showed a 10/10/94 completion date for Final Acceptance Testing. Because of all the changes, OBI and AT&T agreed to a date of 12/18/94. This is beyond the coverage of the Teleconsult contract and no details are known about success or failure of this schedule.

4.4 CUTOVER AND POST CUTOVER SUMMARY

Grouped in Tables R2 through R5 is a summary of the information for the Ramsis #5ESS at cutover, three weeks after cutover (where data is available), and after Provisional Acceptance. This includes information for Lines, Outside Plant (OSP), and Trunks (Transmission Facilities). This is an extract of the information sent to the Vice Chairman of Network Planning in two reports.

<i>CATEGORY</i>	<i>INSTALLED</i>	<i>AVAILABLE OR ASSIGNED</i>
#5ESS Lines	20,000	14,927
Cable Pairs	66,000	66,000
Trunks	2,790	2,100

Table R2 - Summary of Capacity through Provisional Acceptance

Crossbar customers with telephone numbers in the 78-0000 office code and three of the thousands groups in the 74-XXXX code were included as a concurrent transfer with cutover. A summary of transfers is shown in Table R3 below. By contract, cutover did not include the transfer of any lines. AT&T agreed to help ARENTO with their transfers and OBI had no choice but do the same.

Cutover preparations and cutover were the best of the four sites, and after all the difficulties experienced at Ramsis, were very encouraging. Cutover preparations were studied in detail so that the next cutover (Pyramid) could be at least as good or better.

4.4.1 *Lines:* An increase of 2,950 lines occurred after cutover, for an average of 983 lines per week. This was very good progress and the work was well ahead of the schedule established in the Utilization Plan. Almost 350 lines/week were necessary to complete the growth part of the plan by June, 1994. The utilization plan was part of the USAID requirements added after the job was defined.

<i>TRANSFERRED</i>	<i>CUTOVER</i>	<i>THREE WEEKS</i>	<i>PROV ACCEPT</i>
575-0000 - 575-9999	9,122	9,122	9,122
578-7000 - 578-9999	2,855	2,855	2,855
TOTAL	11,977	11,977	11,977

Table R3 - Transferred Lines

Transfer activities added the prefix "5" to each reassigned crossbar lines creating a seven digit number in the '575' code shown in Table R3 above. Customers with office codes in the 47-7000 through 47-9999 thousands groups were transferred and given new office codes in the 578-7000 through 578-9999 groups.

Growth for the #5ESS is shown in Table R4 below. The remainder of the '578' office code is for new regular subscribers and the '580' code is reserved for DID customers. Note the addition of 2,950 new customers since cutover.

<i>GROWTH</i>	<i>CUTOVER</i>	<i>THREE WEEKS</i>	<i>PROV ACCEPT</i>
578-0000 - 578-6999	0	Unknown	2,950
580-0000 - 580-9999	0	0	0
TOTAL	0	Unknown	2,950

Table R4 - New Lines Assigned

4.4.2 Outside Plant Pairs: Table R5 suggests there may be some difficulty in utilizing the site switching capacity if the information regarding the available cable pairs is correct. Several people within ARENTO were very unhappy that OSP gave OBI the defective cable pair information for Giza and neither OBI or Teleconsult could obtain the same details for any other site. This condition did not seem to bother anyone except the DSS team and USAID. The information shown below is the estimate of cable pairs the DSS Team could produce.

The number of Switch lines at cutover was 57,000. The Crossbar equipment (30,000) plus the 20,000 lines of #5ESS and 7,000 lines of NEC 64 in a Mobile Trailer resulted in the total shown above. Unlike other sites, this remained the total after cutover because the crossbar codes were removed from service concurrent with cutover.

	<i>CUTOVER</i>	<i>3 WEEKS</i>	<i>PROV ACCEPT</i>
Cable Pairs	66,000	66,000	66,000
Switch Lines	57,000	57,000	57,000
OSP Pairs to Switch Lines	1.16	1.16	1.16

Table R5 - Switch Lines and Cable Pairs

4.4.3 **Trunk Circuits:** Listed below in Tables R6 and R7 is a comparison of trunk circuits at the three intervals and their status. Ninety-three Digital Facility Interface (DFI) circuits were installed as part of the contract, resulting in 2,790 trunks. A transfer of five DFIs (150 circuits) from the Pyramid spare equipment during November, 1993 increased the trunks to 2,940.

<i>TRUNK CIRCUITS</i>	<i>CUTOVER</i>	<i>THREE WEEKS</i>	<i>PROV ACCEPT</i>
Required	2,790	2,790	2,940
Installed	2,790	2,790	2,790
In software	2,790	2,790	2,790
Activated	2,010	2,010	2,100
Ratio	72%	72%	71%

Table R6 - Trunk Circuits Installed vs In-service

All of the hardware and software assignments were installed by Provisional Acceptance (except those scheduled for transfer from Pyramid) and 71% were active. This is the best of the four sites and was clearly demonstrated in their completion rates. It did not cure the changed-number problem that was not intercepted. Those trunks not activated were a direct result of connecting offices not having sufficient terminations to match the Ramsis end, or waiting for a new central office to be placed in-service. This is demonstrated further by Table R7 which reviews the status of trunk groups.

<i>TRUNK GROUPS</i>	<i>CUTOVER</i>	<i>THREE WEEKS</i>	<i>PROV ACCEPT</i>
Installed	26	26	26
Active	20	22	24
Ratio	77%	85%	92%

Table R7 - Trunk Groups Installed vs Active

An installed trunk group means that the hardware units (DFI's) are installed, the ODD(Office Dependant Database) includes the trunk group number and member information, and the assigned DFIs are cabled to the appropriate fiber optic distributing frame. In essence, everything is done at the #5ESS location to cause trunking and the problem is elsewhere.

Upon completion of Provisional Acceptance, 92% of the trunk groups and 71% of the trunk units were active to support 75% of the installed lines.

This was very obvious when the COM Center became operational in March 1994 and busy hour trunking showed completion rates in the low 50% range which was typical of the other offices.

4.5 SUMMARY:

Even though Ramsis was not a well designed and prepared site, the multitude of problems were successfully addressed and the switch progressed to a "ready for cutover" state. The same was also true of network preparations. It was clearly an example of what ARENTO can do when they dedicate themselves to working together.

Ramsis was so different from the other sites, it was used thorough-out the exit briefing with ARENTO and USAID as to what is a reasonable expectation that ARENTO's organization can produce.

The material presented at the exit briefing was not always positive because Ramsis had far too many problems to be totally positive. The material was intended to show what went wrong and the actions used to correct or compensate for the problems. It was used to show ways of realistically monitoring progress using techniques totally different from usual habits.

It is the firm belief of the DSS Lead Engineer that ARENTO accepted the information in that spirit. It is also the opinion of the Lead DSS Engineer that given four more cutovers like this project, results will be almost identical unless ARENTO makes major changes in their attitude about customer service and modifies their organization to match the changed attitude if it occurs.

5.0 PYRAMID EXCHANGE - PYRAMID ROAD

The Pyramid site is a residential switch with some business customers. Some of those customers are high users of telephone service when the tourist trade is active. Like most ARENTO offices, it has two distinct business periods, one in the late morning and one in the early evening. However, because of its location, Pyramid is likely to have heavy traffic into the early morning hours because of the tourist traffic. There is a very large demand for telephone service in this area. According to the latest available count at cutover, more than 15,000 people were waiting for a telephone. The list included applications from as old as 1987.

The 20,000 line project (10,000 line addition and 10,000 line crossbar replacement) would ordinarily not last more than 12 months after cutover because of all the demand. Unfortunately, Pyramid was the last cutover and all of the jumper wire (1,600,000 feet) had been used (see MDF area for additional explanations). Consequently, there is no estimate how long the 20,000 lines will last.

5.1 Switch Characteristics

1. Size:
 - (a.) 24,000 Lines #5ESS (20,000 New Lines, 4,000 Lines from existing RSM)
 - (b.) 56 Line Units (LU)
 - (c.) 17 Switch Modules (SM)
2. Concentration Ratio: 8:1
3. Outgoing Trunks: 1,380
4. Incoming Trunks: 1,350
5. Digital to Analog Converters: 120
6. Outgoing Traffic: 1,224 Erlang
7. Incoming Traffic: 1,176 Erlang
8. Call Rate/Subs-Outgoing: 0.051
9. Call Rate/Subs-Incoming: 0.049

5.2 Site Characteristics

5.2.1 **Site capacity:** Upon completion of the #5ESS, Pyramid had 20,000 lines of crossbar, 6,000 lines of NEC in Mobile Van, and 24,000 lines of #5ESS for a total site capacity of 40,000 lines. (A Commodity Import Program, AID Grant No. 263-K-624, during 1994 increased the site capacity to 34,000 lines of #5ESS.

5.2.2 **Equipment Location:** The original proposed location presented by AT&T and accepted by the ARENTO Planning Department was truly unbelievable. The ESS was shown on the second floor in a small room that would only hold the initial

installation and relocation of the RSM. The MCC would have been in another room away from the ESS. When the first addition happened, another ESS area would have been started and hold about 20,000 lines. Then another area would have started growing into the second ESS area if the transmission room was relocated. This was totally unacceptable to the Implementation and O&M Departments

Fortunately, logic prevailed and AT&T agreed to furnish another proposal using space on the first floor, based upon a joint OBI, Teleconsult, ARENTO, and AT&T work session at the site. The difficulty of this design was that a major portion of the area needed was being used by the RSM and the fiber optic terminal for the RSM's umbilical link to Pyramid West. Sliding the RSM out of the way temporarily was not a real problem. Relocating the fiber optic bay was another matter. The transmission people refused to even try to locate another bay so that transfer could be very efficient. Instead, the bay had to be moved and recabled in the new location. No one on ARENTO's executive staff liked this approach and they vigorously opposed it for close to a month. Until the fiber optics room was cleared, no rearrangements could start for the ESS area. Further explanation is provided in the Alterations Section. After all parties finally agreed, the ESS was located on the first floor across the hall from the MDF room. As a result, it provided the second best arrangement of the four sites. The area could easily accommodate 34,000 lines at cutover and removal of the crossbar power equipment would allow expansion to more than the 60,000 line objective.

The HVAC is located within the ESS area of the first floor and can be easily expanded to include the additional units needed for the full 60,000 line objective. The HVAC is installed on raised floor to allow underfloor air flow to the ESS frames. The condenser units are mounted on the roof of the building and presented only minor difficulties. Additional units can be added without major difficulty.

Batteries, Rectifiers and Power Bays caused several changed decisions but in the end a decent arrangement resulted. The batteries were located in the old crossbar battery room. More information is provided in the Alterations section. The rectifiers and power bay are located in a new power room on the first floor in an area previously used by the crossbar meter readers.

MDF: Twenty-two verticals on the existing Ericsson MDF were used to terminate the 24,000 lines. The MDF is located on the ground floor. Protector modules were incorrectly ordered by ARENTO and had to be transferred to another site.

How those twenty-two verticals came about is another matter and many heated debates occurred before and after decisions were made. AT&T recommended more verticals at the non-growing end of the MDF but Planning and OSP

vigorously opposed the suggestion. Nowhere on the frame were there anything close to twenty-two contiguous verticals. The Implementation Department was caught in the middle but finally reached a workable decision. Five uprights were added to the non-growth end of the MDF. The T&R blocks for the crossbar lines on seventeen verticals were unbolted and laid back to the rear of the horizontal shelf. This allowed AT&T to terminate the ESS lines without interfering with the ARENTO jumpers. Although far from an ideal solution, it was the only one available to ARENTO.

The ARENTO MDF crew was opposed to the idea from the first day and did everything they could to cause difficulty. In turn, the AT&T crew wasn't excited about stopping their cabling duties while the MDF crew "looked for troubles". This resulted in numerous jumper problems and several hundred jumpers had to be run again, wasting very precious jumper wire. Further, Pyramid used the ESS jumper wire for their normal activity which was not included in the estimate. An average jumper is close to 18 meters on this MDF. Surprisingly, the AT&T workmanship was as good or better than any other site.

As a result of this arrangement, both crossbar and ESS jumpers covered the T&R blocks and were still covered when the site was last visited in March 1994.

- 5.2.3 **MCC: The Maintenance and Control Center (MCCP):** The MCCP is located in the ESS area and presented several difficulties which will be covered in the Alterations explanations. After cutover and relocation of the RSM, Pyramid had the best arrangement of any of the MCC areas.
- 5.2.4 **Standby Power:** Three diesel generators with a total capacity of 585 KW were furnished. The generators were installed in new equipment bays on the ground floor. The control room for the generator system is on the ground floor. This was clearly the most difficult problem of all sites and tested every fiber of the DSS team's abilities to get something done. More information is included in the Alterations discussion.
- 5.2.5 **Equipment Access:** An outside hoisting arrangement was used by ATT&T and essentially presented very few problems. When extremely heavy equipment was lifted, AT&T rented a large commercial hoist for those items. Unfortunately, the crane crushed an underground cable conduit between the building and the renovated power area while lifting condenser units to the roof.
- 5.2.6 **Alterations:** In essence, none of the alterations and modifications progressed as planned or as promised. ARENTO promised AT&T so many building ready dates, it is difficult to recall all of them from the records. AT&T needed the ESS and DC Power areas by April 26, 1993 to maintain the November 2, 1993 cutover date and the new generator area no later than August 15, 1993. AT&T later

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adjusted their date to May 6, 1993 by accelerating the DC Power installation. Although the ESS area wasn't totally ready, AT&T accepted the area on May 11, 1993 and started installation the next day. This was more than two weeks later than needed for a compressed installation period. The Generator Building was accepted on October 10, 1993 and the equipment was delivered the same day. This was just short of a two month delay.

There is such a lengthy set of circumstances that a review of the files listed below would be better. These files are dated January 24, 1993; March 9, 1993; and even the October 3, 1993 file still shows that all work at Pyramid by ARENTO still had not been completed. These files described all areas of the project and are attached as Annex A and B.

AT&T agreed to use a temporary breaker for AC Power because a new Electrical Distribution Building was under construction. Consequently, on the night before cutover, the final power was installed and the last step of pre-cutover testing was completed.

5.2.7 *Outside Plant:* Outside Plant was not part of the DSS Project but could impact the use of the #5ESS lines. See Table P2 for additional information.

5.3 MILESTONE EVENTS

Table P1 gives a summary of the contractual milestones required for the Giza, the adjustments made through various agreements to those dates, and a comparison of the actual results to scheduled dates.

There were obviously many problems, and most of them totally unnecessary, which made meeting the milestone dates at Pyramid very demanding. In fact, AT&T wrote a letter to ARENTO dated September 22, 1993 explaining that the delays (nearly two months) with the generator area will cause them to miss the contractual cutover date of November 2, 1993. Consequently, they asked for a four week extension (November 25, 1993) to compensate for the time lost. Although the DSS Team fully supported the request and worked with ARENTO to make sure they understood, OBI answered AT&T's letter in December 1993 after cutover was complete. Technically, AT&T was in default of the contract.

<i>MILESTONE</i>	<i>CONTRACT</i>	<i>ACTUAL</i>	<i>CHANGE</i>	<i>NOTES</i>
Effective Date of Contract	11/03/92	11/03/92	0	1
Equipment Shipped	11/15/92	11/15/92	0	1
Equipment Shipped	03/07/93	03/07/93	0	1
Customs Clearance	12/13/92	12/10/92	+5	1
Customs Clearance	04/05/93	05/12/93	-37	1
Installation Start	03/25/93	05/12/93	-47	2
All Equipment of site	12/18/92	05/02/93	N/A	2
All Equipment of site	12/18/92	05/15/93	N/A	2,3
Installation Testing Complete	08/23/93	N/A	N/A	4
Training Complete-Ph I	08/10/93	07/27/93	0	5
Training Complete-Ph II	1994	Unknown	?	5
24 Hour Load Test	10/26/93	10/21/93	+5	2,6
Pre-cutover Test Complete	11/24/93	11/21/93	+3	2,7
Cut-over (20K Host) Complete	11/25/93	11/22/93	+3	2,8
Cut-over Time	12:00am	00:38am	-38min	
Prov Accept Test Comp-(20K Host)	12/31/93	12/28/93	+3	2,9
Prov Accept Test Comp- (4K RSM)	01/20/94	01/20/94	0	2,10
Prov Accept Cert Comp- (20K Host)	01/20/94	01/20/94	0	2,11
Prov Accept Cert Comp- (4K RSM)	03/07/94	03/07/94	0	2,12
Final Accept Test Comp-(20K Host)	12/29/94	Unknown	?	2,13
Final Accept Test Comp-(4K RSM)	02/13/95	Unknown	?	2,14

Table P1 - Summary of Milestone Events

NOTES:

1. As listed in the AT&T CPM dated 12/12/92 to support a 52 week schedule. This was long before the many delays started.
2. AT&T CPM dated 12/12/92 showed a 05/02/93 installation start. Several new start dates were proposed and OBI and AT&T tried to agree with all of them. The last start date was 05/12/93 for the DC Power and ESS and September 01, 1993 for the Generator.
3. AT&T CPM dated 12/12/92 showed a 03/01/93 all equipment on site date. Since several changes in site design occurred, a second ship date was necessary for slightly different equipment.
4. Milestone is meaningless and was not tracked. 24 hour load test is significant and was tracked very closely.
5. According to the contract, training was to complete prior to the first contractual cutover of 08/10/94 (Opera). ARENTO requested deferral of the Advanced Training until 1994 and OBI and AT&T agreed. A date for the advanced training was unknown at the completion of Teleconsult's involvement.
6. AT&T CPM dated 12/12/92 showed a 09/25/93 load test date. Due to all of the schedule adjustments, a completion date of 11/20/93 was agreed upon. Completed early with a 99.9986%, the second best results for the four sites, success ratio. Requires 99.99% for test to be successful.
7. AT&T CPM dated 12/12/92 showed a 09/19/93 pre-cutover test date. Due to all the changes, the last date set was 11/24/93. OBI and AT&T agreed resulting in a test complete date of 11/24/93 which ARENTO changed to 11/21/93 at the last minute because their Chairman arbitrarily agreed to use Pyramid as the dedication site and that was the day he could attend.
8. AT&T CPM dated 12/12/92 showed a 11/02/93 cutover date which did not include a transfer of lines. OBI and AT&T agreed resulting in a cutover date of 11/25/93 which ARENTO changed to 11/21/93 at the last minute because their Chairman arbitrarily agreed to use Pyramid as the dedication site and that was the day he could attend. According to ODD records, 2,243 Crossbar customers and 3,895 RSM customers were transferred to the #5ESS at cutover. This left over 2,000 crossbar customer scheduled for transfer in a pre-cut stage in the ESS which is not an intelligent situation. See later comments about quality of line transfer.
9. AT&T CPM dated 12/12/92 showed a 11/10/93 completion date for Provisional Acceptance Testing. Because of all the changes OBI and AT&T agreed to a completion date of 12/31/93.
10. AT&T CPM dated 12/12/92 was based upon a 12 week interval between cutover of the 20K host switch and the 4K RSM and showed a 01/05/94 completion date for Provisional Acceptance Testing. Because of all the changes OBI and AT&T agreed to a new completion date of 01/20/94.
11. AT&T CPM dated 12/12/92 did not include a milestone for the Provisional Acceptance Certificate. OBI insisted upon this milestone and AT&T and ARENTO agreed resulting in a completion date of 01/20/94 for the 20K host switch.
12. AT&T CPM dated 12/12/92 did not include a milestone for the Provisional Acceptance Certificate. OBI insisted upon this milestone and AT&T and ARENTO agreed resulting in a completion date of 03/07/94 for the 4K RSM relocation.
13. AT&T CPM dated 12/12/92 showed a 11/12/94 completion date for Final Acceptance Testing for the 20K host switch. Because of all the changes, OBI and

- AT&T agreed to a new date of 12/29/94.
14. AT&T CPM dated 12/12/92 showed a 02/27/95 completion date for Final Acceptance Testing for the 4K RSM relocation. Because of all the changes OBI and AT&T agreed in a new date of 02/13/95.

5.4 CUTOVER AND POST CUTOVER SUMMARY

Grouped in Tables P2 through P5 is a summary of the information for the Pyramid #5ESS at cutover. This includes information for Lines, Outside Plant (OSP), and Trunks (Transmission Facilities). Information previously sent to the Vice Chairman of Planning is the basis for the following charts. ARENTO did not hold a close-out meeting in December as planned to finalize last minute details.

<i>CATEGORY</i>	<i>INSTALLED</i>	<i>AVAILABLE OR ASSIGNED</i>
#5ESS Lines	24,000*	13,935
Cable Pairs	48,200**	48,200
Trunks	2,880	1,456

Table P2 - Summary of Capacity (Incomplete)

* The Pyramid #5ESS cutover with 20,000 installed lines. In less than seven weeks, the 4,000 RSM lines were relocated to the host switch during January 1994, increasing the #5ESS capacity to 24,000 lines.

** Due to the strong difference of opinions resulting from the defective pair count at Giza, no other site manager would allow his engineers to share comparable information at any other site. Pyramid obviously had enough cable to cutover but 48,200 is the best estimate available.

Cutover included the simultaneous transfer of the Pyramid RSM customers with telephone numbers between 582-0000 and 582-3999. Crossbar customers with telephone numbers between 85-0000 and 85-4999 were supposed to be included in the concurrent transfer. However, confusion at the site between the site manager and the Projects manager, left over 2,000 crossbar customers in the pre-cut mode. A summary of transfers is shown in Table P3 below. By contract, cutover did not include the transfer of any lines. AT&T agreed to help ARENTO with their transfers and OBI had no choice but to do the same.

Although cutover preparations and cutover should have been the best of the four sites, they were not. In fact, it is difficult to say whether Opera or Pyramid was worse. The

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lack of jumper wire obviously had some impact and keeping it a secret until the last minute didn't help. The Minister's and Chairman's last minute decision to use Pyramid as the dedication site caused over five days of lost work just to make the site "beautiful" instead of working for and after the cutover. The major disagreements that the site manager had with everyone else to cleanse himself of any responsibility certainly didn't help. This was an extremely disappointing situation after making up almost two months of wasted time to let it perish in such a terrible climax.

5.4.1 *Lines:* Any increase in lines after cutover was to correct those in a pre-cut mode before the Recovery Test during Provisional Testing. The site manager would not agree to a Utilization Plan and neither USAID or OBI complained.

<i>TRANSFERRED</i>	<i>CUTOVER</i>	<i>THREE WEEKS</i>	<i>PROV ACCEPT</i>
582-0000 - 582-3999	3,895	Unknown	3,895
582-4000 - 582-9999	0	Unknown	1,516
585-0000 - 585-4999	2,443	Unknown	4,083
585-5000 - 585-9999	-0-	Unknown	4,101
TOTAL	6,338	Unknown	11,955

Table P3 - Transferred Lines

Transfer activities added the prefix "5" to each reassigned crossbar lines creating a seven digit number in the '585' office code shown in Table P3 above. Very little imagination is needed to predict the problems associated with inter-office calling by looking at the working crossbar customers that were not transferred. This is especially true for those numbers that were scheduled to transfer and did not because of preparing for a dedication instead of cutover.

Intended growth for the #5ESS is shown in Table P4 below. The '585' office code is for regular subscribers and the '584' code is for DID customers.

<i>GROWTH</i>	<i>CUTOVER</i>	<i>THREE WEEKS</i>	<i>PROV ACCEPT</i>
582-4000 - 582-9999	0	Unknown	1,980
584-0000 - 584-9999	0	0	0
TOTAL	0	Unknown	1,980

Table P4 - New Lines Assigned



5.4.2 *Outside Plant Pairs:* Several people within ARENTO were very unhappy that OSP gave OBI defective cable pair information just before Provisional Acceptance Testing. They were so unhappy that neither OBI or Teleconsult could obtain the information for any other site. Numbers were given in some cases but when an attempt was made to verify the accuracy, the numbers proved invalid.

	<i>CUTOVER</i>	<i>3 WEEKS</i>	<i>PROV ACCEPT</i>
Cable Pairs	48,200	48,200	48,200
Switch Lines	47,000	40,000	40,000
OSP Pairs to Switch Lines	1.02	1.21	<i>1.21</i>

Table P5 - Switch Lines and Cable Pairs

5.4.3 *Trunk Circuits:* Listed below in Tables P6 and P7 is a comparison of trunk circuits at the three intervals and their status. Ninety-one Digital Facility Interface (DFI) circuits were installed as part of the contract, resulting in 2,730 trunks. A transfer of five DFIs (150 circuits) from the spare RSM equipment during November, 1993 increased the trunks to 2,880.

<i>TRUNK CIRCUITS</i>	<i>CUTOVER</i>	<i>THREE WEEKS</i>	<i>PROV ACCEPT</i>
Required	2,730	2,730	2,880
Installed	2,730	2,730	2,880
In software	2,730	2,730	2,730
Activated	810	1,020	1,456
Ratio	29.7%	37.4%	50.6%

Table P6 - Trunk Circuits Installed vs In-service

Even though 95% of the hardware and software assignments were installed by Provisional Acceptance, only 50.6% of the trunks were active. These problems were a direct result of connecting offices not having sufficient terminations, adequate transmission facilities, or incorrect software to match the Pyramid end. This is demonstrated further by Table P7 which reviews the status of trunk groups.

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<i>TRUNK GROUPS</i>	<i>CUTOVER</i>	<i>THREE WEEKS</i>	<i>PROV ACCEPT</i>
Installed	24	24	24
Active	8	12	20
Ratio	33%	50%	74%

Table P7 - Trunk Groups Installed vs Active

An installed trunk group means that the hardware units (DFI's) are installed, the ODD (Office Dependant Database) includes the trunk group number and member information, the assigned DFI's are cabled to the appropriate fiber optic distributing frame. In essence, everything is done at the #5ESS location to cause trunking and the problem is elsewhere.

Upon completion of Provisional Acceptance, 74% of the trunk groups and 51% of the trunk units were active to support 26% of the lines that were assigned and in-use. With so few lines, when the COM Center became operational during March 1994, the busy hour statistics showed completion rates in the low 50% range which is quite good compared to other office.

These results are typical of all four offices except Ramsis which was much better in every respect.

5.5 SUMMARY:

Even though there was tremendous effort on the part of AT&T, the DSS team, and some members within ARENTO to overcome the problems and have the switch reach a "ready for cutover" state, it was still a terrible cutover.

After the cutover, the RSM relocation, and completion of the MCC, this proved to be one of the best designed sites within ARENTO. Granted, good appearance isn't necessarily good performance but the trunking statistics collected by the COM Center showed Pyramid as one of the best performers of all ESS sites. It was only second best to Ramsis of the new sites.

To ARENTO's credit, they did pursue the trunking aspect of their network after cutover and made significant improvements. If that same effort was applied to the line side of the switch, many thousands of people on the waiting list could have had telephone service.

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If ARENTO disclosed the number of complaints and troubles for the five days immediately after cutover, they would match the long lines of customers complaining about their lines being of service. In essence, the MDF preparations were woefully lacking no matter how much prodding by the DSS team. This overshadowed a tremendous amount of good work that preceded the cutover.

Pyramid had the benefits of all the experiences gained at the first three sites. They chose not to take advantage of any of that information. Pyramid had all of AT&T resources available for any kind of support they needed but they chose not to use them until they had to prepare for the dedication and the minister. They would rather nit-pick AT&T and ARENTO's Implementation staff about details that contributed nothing to a cutover.

Pyramid had access to an MDF crew that just completed an outstanding job at Ramsis but they didn't need them. Instead, they ran over 6,850 jumpers for transfer but only used 6,338 of them because the rest were incorrect. Pyramid didn't need the additional crew because they only averaged 204 correct jumpers per day instead of the 300 per day they needed. Pyramid didn't need someone to check their jumper progress because they would have all the jumpers done in time. Until the day of cutover, the site manager insisted that he had done over 7,000 jumpers when the weekly information given him and the ARENTO Project Manager clearly proved he overstated his work.

Pyramid had access to one of the best transmission engineers on ARENTO's staff but severely angered him every time he tried to help. They had their own resident engineer on-site and didn't need that staff in their office.

Pyramid could have been, should have been and might have been a good cutover, but it wasn't.

6.0 COM CENTER:

The Multi Function Operations System (MFOS) is used by the COM center to perform day-to-day switch monitoring, operations, traffic data collection and analysis, and subscriber and trunk assignment.

MFOS consists of the switch maintenance subsystem (SMS), used for alarm monitoring and processing, the traffic subsystem (TFS) used for traffic data collection, and the subscriber data assignment subsystem (SDAS) for subscriber and trunk assignment.

6.1 SITE CHARACTERISTICS

6.1.1 *Cairo:*

The Cairo center is located in the El Kalaa exchange and consists of 11 operator positions with VDUs and keyboards, a system console for system control, a large screen display, an annunciator, and associated hardware and software. Each #5 ESS exchange is connected to the center by six cable pairs for sending and receiving data. The center is connected to the COM center in Alexandria by a software trunk (SWT).

6.1.2 *Alexandria*

The Alexandria COM center is located in the Auto exchange and consists of the same equipment as in Cairo, except it is equipped with only three operator positions. It is connected to all #5ESS exchanges by six cable pairs for sending and receiving data.

6.2 MILESTONE EVENTS

Milestone	Contract date	Actual date
Effective date of Amendment No. 2	5/24/93	5/24/93
Start Installation	7/24/93	7/31/93
Cutover (Operational)	2/28/94	9/30/93
Complete Provisional Acceptance	4/28/94	4/14/94
Complete Training	4/14/94	2/16/94
Start Maintenance	4/28/94	4/14/94
Final Acceptance	4/28/95	-

6.3 CUTOVER

Although the contract did not contain a cutover milestone date, the center was operational on September 30, 1993. The installation had few problems which were readily overcome by ARENTO and ATT. ARENTO was late in providing the six cable pairs to each office and the facilities for the SWT. During testing, ATT encountered some software problems which were corrected by installation of a new AWJ11 board.

After the center was operational, it was used by ATT for training ARENTO personnel in all phases of MFOS operations. When training was completed, Provisional Acceptance testing was started. Again, the testing had few problems which were readily fixed and testing was completed with ATT providing ARENTO with information and help above and beyond contract obligations.

6.4 SUMMARY

The COM center installation and cutover was well organized and there were few problems. The testing of the COM center was also easily accomplished and the center made operational and ready to be used for training of ARENTO personnel. When training was completed, the COM center was ready for ARENTO's monitoring of #5ESS exchanges.

7.0 LESSONS LEARNED:

The DSS Team spent over a year in Cairo working with ARENTO, USAID and AT&T. They gained considerable insight and appreciation of the strengths and weaknesses of the involved organizations. The following paragraphs express their impressions and are not meant to be critical. They are expressed in the hope that they will be viewed as constructive and will help to strengthen ARENTO in meeting future challenges in provisioning additional switching capacity in Cairo.

The following comments are to show ARENTO and USAID that making only technological changes within their network will not provide the improvements that should be made. It may improve the network to their satisfaction but it will not bring about the changes USAID expects. The network improvements will probably enhance the telephony infrastructure to a point of pleasing local investors. In contrast however, Western investors expect far more from the network and they will probably be less ambitious with monetary ventures in Egypt. The ARENTO organization needs a major overhaul to attain the efficiencies of North American telephone systems. The current evolution of ARENTO is much too slow to help Egypt grow economically.

7.1 ARENTO MANAGEMENT:

ARENTO does not indicate a real understanding of customer needs and expectations. Most of all, they do not seem to realize how their network can be of assistance to expand Egypt's economy and job base, which also helps to increase the tax source for the Government of Egypt.

Senior members of ARENTO consider themselves on a par with the rest of the world in their knowledge of telephony techniques and infrastructure. As a result, they do not take kindly to being embarrassed by foreigners trying to assist them in improving their telephone network or their customer base.

7.1.1 *Orders will be done* - Senior Management practices the belief that they have only to command and their wishes will be done. In theory, most senior executives have the same thoughts. The difference is that even when ARENTO's Senior Management knows something cannot be done, they command it anyway. If those affected by the command can't get the job done, they must be inferior workers. The worst example of this attitude occurred during cutover preparations at all sites, but it was consistently demonstrated throughout the project. For example, AT&T International told the consultant and ARENTO that the Ramsis site must be totally ready for Installation no later than February 1, 1993 if Contractual Cutover was to be achieved by November 2, 1993. The previous consultant and ARENTO agreed during October 1992, and told AT&T International that there is no problem, even though none of the estimated four months of work had started.

The planners for ARENTO actually believe that all they have to do is command and the impossible is automatically done. Further, the ARENTO planners do not even bother to tell the Projects Department of the commitment. This type of problem happened at every site and placed the new consultant in a very difficult position of having to obtain new agreements to replace those incorrectly reached.

ARENTO must be more cognizant of work intervals and must ensure that all involved departments are in agreement with proposed schedules and that effective coordination is established.

- 7.1.2 ***The boss is always right*** - That's the official view from the top. No matter how much training the engineers and managers receive, they still do not have enough authority to influence decisions by Senior Management. No matter how different a new switching or transmission system may be, Senior Management always knows best!

The middle and bottom of the organization is there for the sole purpose of doing only what the top wants done. If they disagree, or worse don't do what is commanded, there is substantial misery in store for the offenders.

There are exceptions but for the most part ARENTO wastes the technical training they select for their engineers and managers. This attitude was very evident during Provisional Acceptance Testing and at the COM Center.

- 7.1.3 ***The boss is never right unless he's present*** - That's the view that is practiced from within the organization. ARENTO's engineers probably learn more than their Senior Management intended when they sent them to training in the United States. Obviously, the engineers are taught a great deal about the technical aspects of a system but they also learn a lot about the "Whys" of system design, testing techniques, and operating procedures.

When they return from training, the better engineers try to share this additional knowledge with their bosses. Almost without fail the boss disagrees, and not because of the merits of the idea but because he is boss. Consequently, the better engineers are critical of their bosses when he is not in the room. Because the engineer believes they are right, they often want the consultant to "market" the ideas they were unable to sell.

Management training all the way up the line is urgently needed to enable ARENTO managers to build effective teams that will utilize the total team expertise.

- 7.1.4 ***Why well trained engineers leave ARENTO?*** - The ARENTO engineers are very well trained by AT&T International and can usually make more money with other

companies. However, that isn't the only reason they leave ARENTO, and plenty of them do leave. We're told that it is often the most gifted engineer that leaves ARENTO.

Incentives are needed to retain these competent engineers in addition to better salary treatment. It should be obvious, after reviewing subsection c. above, that just having their ideas heard, would give the engineers immense satisfaction. More often than not, their ideas make good sense.

- 7.1.5 ***Why Managers don't leave ARENTO?*** - This is a continuation of the views expressed in subsection 7.1.4. above. Lower level managers also experience some of the same frustrations as the engineer but they do not leave ARENTO. Their decision to stay may be due in part to loyalty but more likely, it is because the manager has already adjusted to ARENTO's influence. If he ever hopes to rise in the organization, he cannot be known as a "trouble maker". He must always do as he is told.

These patterns will stay with the technical manager and will influence his operations when he becomes a more senior manager, or higher within ARENTO's hierarchy? Management training in successful management is urgently required.

- 7.1.6 ***When the contract is signed, my job is done until the next contract.*** - It does not matter if this statement came from Planners, those in Stores and Purchases, or Traffic, it means the same. There is no accountability for how the activities of one department impact the rest of the organization or the network.

If the building plan is wrong, the Projects Department will correct any differences. If the traffic information is incorrect, O&M will manage the best they can with what they have like they always do. Further, O&M doesn't want the Traffic people interfering with their views on how to manage the network.

Teamwork must be instilled at all levels of the organization and work incentives must be established. Managers must learn to take on responsibilities for their work actions.

- 7.1.7 ***Why should I worry about engineering - AT&T and Planning will take care of that on the next job.*** - This is a continuation of subsection 7.1.6 above. It produces results that repeat the same problems. Since there is so little interaction between Projects and Planning, even the items that cause headaches with every job, are not communicated to Planning.

Typical examples of this attitude are the MDF orders at Pyramid. Additional details are described in the Site Summary paragraph 5.5.

7.1.8 **Customers, who needs them?** - If a customer can help me get promoted, he is important. Otherwise he gets dial tone like everyone else...when I have time. It does not matter that people in O&M can also do this job. It is my job to do and the customers will have to wait until I have time to get it done.

That is a dreadful attitude but it happens, and far more often than anyone will admit. Additional details are described in the Site Summary paragraphs 2.5, 3.5 and 5.5. The Spirit of Service must be instilled in all levels of the organization, starting at the top.

7.1.9 **Sure I can plan a cutover for tomorrow, if the Chairman agrees - Why should I decide earlier?** ARENTO's cutovers are not transparent as they could and should be. They are not planned to minimize the impact on customers or the network. In pure and simple terms, cutovers are "planned" and implemented to make the Minister and Chairman look good.

Again, the desire to provide good service to the customer must become the goal of all ARENTO employees.

7.2 ARENTO Organization:

7.2.1 **Traffic** - ARENTO is fortunate to have a Traffic Manager who knows the necessary details about studies, data collection, network management, and traffic information. She is extremely capable of bringing major improvements to the ARENTO network. Unfortunately, she faces four major problems almost daily.

(1.) **She has almost no staff** and must do the vast majority of the work herself. No telephone company in North America with over two million working lines in forty-three Cairo exchanges (many exchanges have multiple switching systems) expects so much from one person. This is especially difficult when you consider the different formats and data that is produced by the various systems and the different forms of traffic demanded by various manufacturers to engineer their switch. *This is one of the major reasons why so little "Traffic Order" information is contained in the Technical Specifications.*

(2.) **The data she receives from each switch is vastly different and overwhelming.** Although a significant portion of ARENTO's network has digital lines, the different ways to measure and report those lines is extensive. The raw data she receives from the #5ESS is too much for even a small staff to comprehend. It is far too much for one person to digest and use.

(3.) **She has no authority to influence trunk group management.** That is an O&M responsibility and they do not relinquish their responsibility; and they

clearly do not comprehend traffic management at either the exchange or network level.

(4.) **She is not part of the Power Circle** and her good ideas generally fall on deaf ears.

All of these reasons yield meager traffic data which produces very poor traffic information. Inexperienced consultants unknowingly include this in the Technical Specifications thinking they did a good job. Instead, they merely perpetuate the problem.

7.2.2 **Planning:** ARENTO has very capable and knowledgeable engineers in their Planning Department. For the most part, they are well trained and understand the major aspects of the #5ESS. Like their North American counterparts, they are not experts in all phases of engineering for the #5ESS. Unlike those same counterparts, they do not seek the information they desire or need from ARENTO engineers who should have the information. Instead, they seek information from the local AT&T International Sales Office.

Philosophically, there is nothing wrong with this approach, but it does create problems and it presented difficulties for the DSS Team. Some examples are as follows:

- (1) It excludes their own people from very useful planning information.
- (2) It does not give Project's engineers an opportunity to share valuable "Lessons Learned" from past projects.
- (3) It helps to create the atmosphere that Planning will do what Planning thinks they must do to get a signed contract.
- (4) It helps to perpetuate the idea that the Projects Department must continue as they have to complete the project.
- (5) There is absolutely no synergy between the Planning and Projects Departments.

7.2.3 **Engineering:**

(1) **Systems** - Although ARENTO has many graduate engineers, they do not have an engineering department for their American Digital Systems. Their Projects Department tries to perform the role of both engineering and installation oversight. Unfortunately, there is neither enough of these engineers nor are they trained in the best way to do both jobs. When they are compared to what their fellow ARENTO engineers did with analog systems such as crossbar, their digital capability is inadequate.

Consequently, they rely heavily upon the vendor and consultant for engineering support. Since their training is based upon the recommendations of a vendor and not what the engineers know they need, an additional work load is imposed upon the consultant.

(2) ***Buildings and Power*** - ARENTO's building and power engineers are more abundant and generally well trained but they do not function like engineers in a North American telephone company. They do not use standards or codes as we are so accustomed to in North America. Instead, they frequently rely upon local Egyptian subcontractors for design and installation. Just as often as not, installation starts without checking the designs.

None of the ARENTO engineers rely upon an internal drawing system or even a technique to verify the quality and accuracy of the vendor's drawings. It does not take much vision to imagine the problems this creates.

Building requirements are very straight forward for systems like the #5ESS. Unfortunately, the buildings department is among the last to know when work is needed and the details of the work to be done. This is primarily caused by the autonomous relations between departments and the way contracts are settled. The buildings department is not consulted at anytime during contract negotiations and all decisions are made by planning engineers.

Even though the planners are knowledgeable of the #5ESS, they have not a clue regarding equipment arrangements and other details that a good equipment engineer or building engineer must know. As stated earlier, they do not seek that information from those who should know. The buildings department generally learns from the Project Manager within the Projects Department what is needed and when it is needed. *The information shared by the Project Manager may or may not be what was agreed to during negotiations.*

For a variety of reasons, many of the functions performed by the Buildings and Power Department caused problems at every site. Unfortunately, some sites were much worse than others. This can be better understood by reviewing the details of the Generator Area at Opera and Ramsis in paragraphs 2.3.6 and 4.2.3.

7.2.4 ***Operations and Maintenance:*** The O&M Department has the most impressive staff of any area within ARENTO associated with the DSS Project or the #5ESS. Unfortunately, they are capable of much more than they are allowed or willing to do. Because of organizational constraints, they are not allowed to participate directly in cutover preparations. This is unbelievable as O&M knows more about the Customers in that exchange, more about the Network, more about which equipment to replace, and more about the MDF than any group in ARENTO.

To ignore that knowledge does not make sense. More details are described under Site Summaries, Section I for each site.

Including money in the contract to have AT&T International operate and manage a switch for 12 months after cutover is not cost-effective. If O&M was incapable of managing the new switch, that could be understood. But O&M is capable of maintaining the switch and it would be an enormous vote of confidence to their engineers to let them replace AT&T International within the first 90 days after cutover.

AT&T International does not avoid their agreements and they definitely give ARENTO their money's worth for maintenance operations. But AT&T International does not manage traffic. *Managing traffic is of equal importance to maintenance management. Managing traffic is going to help immensely with their congestion problems.*

The O&M Department is not ready to manage traffic within or between switches. Even though the MFOS (Multiple Facility Operating System) is completely operational and they have a good idea about its capabilities, ARENTO is somewhat stubborn about how to manage traffic. It is a classic case of Senior Management not knowing enough of the details to make decisions. It is also another example of Planning having one agenda and O&M another to correct their operational problems.

The return of the DSS Consultant to Cairo to help with the transition to MFOS was beneficial to ARENTO but it wasn't enough. A competent consultant could spend a year helping ARENTO before meaningful improvement with MFOS or traffic management could be expected.

7.3 TECHNICAL DETAILS:

7.3.1 **AUTONOMY:** Just as the Ministry of Communication is autonomous to other ministries; departments (and to some degree individuals) within ARENTO operate completely independent of each other. For example, the contract negotiated by the previous consultant was not between ARENTO and AT&T International as would be expected. Instead, it was between the Planning Department, the Stores and Purchases Department, and AT&T International. The balance of ARENTO views the situation as Planning's agreement, or Stores agreement; but not a commitment by ARENTO (in total) and AT&T International. A few of the differences experienced during the project because of this attitude are as follows:

Neither the Planning Department or the Stores and Purchases Department are directly involved with the implementation of a project. There were plans made that could not or should not be implemented. Specific cases are included in the information for each site.

There is no direct correlation between the size of the project and the currently available (or proposed) feeder and distribution plant to utilize the new system. Sites may or may not have sufficient OSP to utilize the switching capacity of the new system. Specific cases are included in the information for each applicable site.

There is no direct correlation between the transmission systems needed for the new system and those systems that are already installed. Sites may or may not have enough fiber optic cables or systems for anything but minimal quantities at cutover. Specific cases are included in the information for each applicable site.

There is no direct correlation between the terminating equipment needed at the distant exchange(s) for the new system. Connecting sites may or may not have enough trunks, software, intercept, or other requirements for anything but minimal quantities at cutover. Specific cases are included in the information for each applicable site.

If a project is intended to replace existing equipment, O&M is rarely consulted as to what equipment (or number groups) should be replaced, how many lines will be transferred, or when the cutover will occur.

O&M's well trained resources are not used to compliment the Project Departments assets to improve the quality and success of a cutover.

The Projects Department doesn't consider the needs of the MDF group who must maintain the frame during the transition period and after cutover. The transmission engineers do not give any consideration to having a fixed number of systems available for pre-cutover testing and post cutover utilization. O&M doesn't give sufficient consideration to the traffic needs of the system after cutover. Nor does O&M furnish high quality traffic usage information to the Traffic Department on a regular basis to help with long term engineering requirements. Specific cases are included in the Site Summaries, Section I, for each applicable site.

In large part, the planning functions described above are left to the discretion of the Projects Department, specifically the Project Manager for Switching Systems. More often than not, the Project Manager has no direct control or influence over other departments. He must rely upon past relationships, friendships, or even

intimidation to get the job done. Even the good news about ARENTO's latest reorganization will not address and cure all of the above problem areas.

7.3.2 **NEBULOUS:** ARENTO can be a vague organization. There is very little information or few directives written to explain who within ARENTO does what; or why; or when; or how is it done. When there is information, it is a closely guarded secret and cannot be shared with even those trying to help. Simply stated, there is no documented *function and flow process* to explain how information is shared, or how decisions are made. A lot of buck passing results from these omissions.

7.3.3 **CENTRALIZATION:** To some degree, all governments and organizations are at least partially oligarchic. This form of government or organization is considered highly undesirable (and in some cases unlawful) but they exist none the less. Every company has an inner circle that makes all important decisions and contains the bulk of organizational power.

ARENTO is no exception. Egypt's experiment with socialism made oligarchy not only possible, but highly probable. ARENTO can be thought of as an organization of concentric rings. The inner most ring, sometimes called the **POWER CIRCLE**, contains all the power and makes all the decisions. This circle is not limited to only executives and neither does it include all of the senior members of the ARENTO organization.

The next ring includes those people most likely to fully support the policies of the inner ring. It also includes the people already chosen to replace members of the Power Ring. This ring has only the authority granted by the Power Ring, and only makes decisions that completely advance the policies of the Power Ring. Subsequent rings are minor continuations of the principle until there are no rings left to form. All rings are based upon people only and have no relationship to organizational structure.

(NOTE: Formal and informal organizational structure is part of the curriculum for most Industrial Psychology programs. Most consultants have not been exposed to this information and do not know to look for such relationships. Consequently, their accomplishments may suffer because of their attention to the wrong details. Members of USAID are partially correct when they call this a "Management Problem" but this type organization is almost impossible to change without enormous changes in personnel.)

7.3.4 **ARENTO's NETWORK:** ARENTO has an extensive network of fiber cables and systems. A substantial part of their fiber is multi-mode and the vast majority or their routes use back-to-back technology. Further, their local network within Cairo uses two local tandems in vastly different ways.

The analog switches generally trunk between offices with direct groups, using the tandem route for overflow. This method is fairly typical throughout telephone companies.

The digital exchanges are essentially reversed in that most groups are via the two tandems with only a very small percentage of direct groups. Reliable sources tell us that this was done to allow the tandems to behave like quasi-gateway switches because of differences in bit rate for the 24 channel equipment and 30 channel equipment mixed in the same network.

Those same sources also tell us that the European suppliers of fiber optic systems regularly denounce concepts like SONET because it would severely reduce their equipment sales. ARENTO tends to agree since most back-to-back technology will ride on almost any fiber optic cable, even though the mid-point office(s) requires twice the hardware as a normal regenerating station. Further, current systems riding the new fiber optic cable requires far fewer repeaters. All of these outdated applications allow for the sale of more equipment but makes every aspect of managing the network very difficult.

Two aspects were experienced first hand by the DSS team on this project. First, finding enough systems available to activate all trunks at cutover. Next, the completion rate as shown in the daily office summary report is consistently below 40%. A more in-depth explanation is found in the information for each site.

7.3.5 CUSTOMERS: ARENTO has about two million customers and most of them are in the Cairo area. There are generally two types; first, those who have contacts within the government and can cause serious problems for someone trying to do their job correctly; and second, all other customers.

Most ARENTO employees in the Projects Department and the O&M Department do not show any respect for the second category. That is very sad because this group of customers essentially pays their salaries and other ARENTO obligations.

The first group customers essentially belong to the Minister or Chairman. As such, they are entitled to whatever the Power Circle allows. The other group gets what is left over. However, even the special customers do not receive the respect all customers deserve. *This is especially true for the next category; cutovers that involve line transfers.*

7.3.6 CUTOVERS: Even though ARENTO clearly uses the central planning process and all major decisions come from the Power Circle, cutovers with line transfers at three of the four 20,000 line sites still had between poor and disastrous results. Each situation is discussed in more detail under the site summaries section.

The major problem with ARENTO's cutovers is not enough planning. This closely followed by the absence of implementation controls to limit the possibilities for errors. Again, even if the Power Circle agrees with the "Plans" of the Project Manager, they do not give him the tools needed to do a decent job. The only exception was at Ramsis where so many people were worried about how the Ramsis Rag (an area Newspaper) would view and report their performance. The Ramsis situation is described in detail Under Site Summaries, Section I.

8.0 CONCLUSIONS:

All four 20,000-line digital switches were cut over essentially on schedule and in accordance with the specifications. There were many problems encountered during the installation and cutover as covered in this report. Most of the problems could have been avoided and should not re-occur during future DSS installations. Unfortunately, however, they will re-occur unless ARENTO learns from the experience with these four switches and improves their coordination and inter-departmental cooperation.

The above Lessons Learned are stated as the Consultants saw them and are not meant to be demeaning of ARENTO. They could have been sanitized to indicate things went smoothly, but this would not have helped ARENTO in the long run. The only way to improve is to learn from experience and that is the basis for the comments included in this Final Report.

The ARENTO telecommunications network has been greatly improved over the past ten years or so and the potential is there for even greater improvements. However, the key to these improvements is not necessarily more equipment, but better usage of the network already in place and planned. As discussed in the above report, a change in management attitude is essential to establish inter-departmental cooperation and effective management teams that will work together for the good of the organization. A change in attitude towards the customer is also badly needed to enhance ARENTO's reputation in the community, both business and residential.

A major step in this direction is the proposed USAID project covering the Institutional Development of ARENTO. If the results of this program are taken seriously by ARENTO's top management and the changed attitudes are supported by all management levels, a major improvement in network service should result. DSS installations and cutovers should become routine and assistance of consultants should no longer be required.

Outside Plant Contract Completion Items

ARENTO CONTRACT NO. 7/92/30

APPENDIX G CONTRACT COMPLETION AND FINAL ACCEPTANCE

1. Provisional Acceptance

Certificates of Exchange Provisional Acceptance were issued with the following effective dates:

<u>Exchange</u>	<u>Date</u>	<u>Major Outstanding Work</u>
Auto	27 May 1995	EDCT Replacement
Heliopolis	29 Aug. 1995	Grounding Upgrades
Giza	28 Sep. 1995	None

2. Extension of Time

Delays in completing the works within the original 600 day schedule are excused due to special circumstances. ARENTO achieved revenue service within six hundred (600) calendar days after the Effective Date of Contract at Auto and Heliopolis Exchanges, prior to the Contract Completion Date. At Giza Exchange, the Contractor was permitted to complete the works which were delayed by the unavailability of permits. Liquidated Damages are therefore excused. Amendment No. 5 represents the full settlement of all monies due to the Contractor arising out of or respect of the Contract through the last OSP Exchange Provisional Acceptance.

3. Maintenance Program

The Maintenance Program is scheduled to run 12 months from the dates of Exchange Provisional Acceptance. This Program is to be carried out in accordance with the approved MMIS Plan for the Telecoms IV Expansion Project. Gary Miles is approved as the Maintenance Manager and Authorized Representative, providing superintendence during the maintenance period.

ARENTO and the Contractor shall work together to train and qualify ARENTO's Maintenance Teams. The training program must enable ARENTO personnel to take over operation and maintenance of each Exchange Area Outside Plant at the end of its associated Maintenance Period. The Contractor's recommendations for ARENTO's on-going maintenance effort should be reflected in an updated MMIS Plan.

The Contractor is responsible for care of the works until the date stated in the Certificate Of Final Acceptance. The network shall be maintained in good condition and conformity in every respect with the requirements of the Contract, e.g., Clause 6.8 (Maintenance Program), Clause 6.10 (Training Program), Clause 16 (Care of Works), Clause 43 (Guarantees) and Clause 44 (Contractor to Search).

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Outside Plant Contract Completion Items

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Maintenance invoices and Program Management invoices for services during the maintenance period are to be submitted directly to ARENTO for payment approval. ARENTO will issue a Certificate Approving Payment in accordance with Subclause 39.4.5. Note that 5% of the total US Dollar and Egyptian LE amounts for Program Management are to be paid in 12 monthly installments in accordance with Contract Subclause 39.3.2.f.

4. Documentation

"Exchange Documentation" including drawings, test results, inspection certificates, manuals, and related records shall be maintained throughout the maintenance period by the Contractor. The documents are to be stored at each Exchange Maintenance Facility as detailed in the Documentation Plan.

The Ramsis Documentation Center referenced in Contract Volume II, Section 17.10 will not be established. It is agreed that Exchange documentation and equipment, including all items budgeted for Ramsis Exchange, shall be delivered to the ARENTO Exchange Managers upon Final Acceptance.

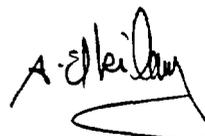
Prior to Final Acceptance ARENTO shall be provided the original as-built drawings updated with all changes occurring through the Maintenance Period. Three (3) full-size reproducible copies of all documentation pertinent to the OSP Exchange Area shall be supplied to each ARENTO Exchange Manager. In addition two (2) full-size copies and two (2) microfiche copies of all documentation shall be provided to the Central ARENTO Documentation Center.

In addition, the Contractor shall maintain Project records throughout the maintenance period and for three (3) years after final payment in accordance with Contract Clause 54. Prior to Final Acceptance, ARENTO and USAID are to be advised of ATTI's permanent storage location for Project records.

5. Maintenance Spares and Surplus Equipment or Materials

The Contractor shall be entitled to retain on the Site, until the end of the Maintenance Period, such Materials, Contractor's Equipment and Temporary Works required for maintenance (Clause 28). This Amendment records the agreement that the Maintenance Spares, which include partial reels of cable, cable closures and miscellaneous construction materials, will be turned over to ARENTO at the end of the Maintenance Period free of charge. Maintenance Equipment being procured as Pay Item 10.4 will be delivered to ARENTO prior to Final Acceptance.

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Outside Plant Contract Completion Items

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CONTRACT COMPLETION AND FINAL ACCEPTANCE

All surplus equipment and materials imported duty free pursuant to the Contract which were not consumed during the performance of the Project nor required as Maintenance Spares shall be re-exported or the duties paid by the Contractor in accordance with Contract Clauses 36.4 and 57.2.

6. Final Acceptance Certification

ARENTO will issue Certificates of Final Acceptance after the successful completion of all obligations under the Contract and certification of Final Acceptance Tests specified in Contract Clause 42.4.1 and required in Volume II Technical Specifications and the approved Telecoms IV Expansion Test Plan. There are no Warehouse Inventories to be accepted by ARENTO under Contract Clause 42.4.2.

Final Acceptances shall be supported with Inspection Certificates prepared by the Contractor to confirm the completion and acceptance of outstanding work items, deliverable items and warranty work. As a minimum Inspection Certificates shall be prepared for:

- a. Replacement of EDCTs at Auto Exchange.
- b. Grounding upgrades at Heliopolis Exchange.
- c. The itemized delivery of all Documentation.
- d. The itemized delivery of Maintenance Equipment, Pay Item 10.4.
- e. The itemized delivery of Maintenance Spares.
- f. Successful completion of maintenance program and delivery of an updated MMIS Plan to reflect the ARENTO Maintenance Organization's on-going plan.

6. Final Payment and Release of Retentions and Guarantees

Final Payment of all amounts due to the Contractor will be made upon receipt of Certificates of Final Acceptance and compliance with the provisions of Contract Subclause 39.3.3.

Guarantees shall be released effective with the Certificates of Final Acceptance, except as required for replaced or renewed parts, e.g., EDCT replacements at Auto Exchange and grounding upgrades at Heliopolis Exchange.

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