STUDY PROJECT



# LESSONS LEARNED FROM A SUCCESSFUL NON-DEVELOPMENTAL ITEM (NDI) FIELDING: MOBILE SUBSCRIBER EQUIPMENT

BY

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APRIL 1990

U.S. ARMY WAR COLLEGE, CARLISLE BARRACKS, PA 17013-5050

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

| REPORT DOCUMENTATION PAGE | | READ INSTRUCTIONS BEFORE COMPLETING FORM |
|---|---|---|
| 1. REPORT NUMBER | 2. GOVT ACCESSION NO. | 3. RECIPIENT'S CATALOG NUMBER |
| 4. TITLE (and Subtitle) "Lessons Learned From a Successful Nondevelopmental Item (NDI) Fielding: Mobile Subscriber Equipment" | | TYPE OF REPORT & PERIOD COVERED Individual Study Project<br>6. PERFORMING ORG. REPORT NUMBER |
| 7. AUTHOR(s) Lieutenant Colonel Robert L. Forrester | | 8. CONTRACT OR GRANT NUMBER(s) |
| 9. PERFORMING ORGANIZATION NAME AND ADDRESS U.S. Army War College Carlisle Barracks, PA 17013-5050 | | 10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS |
| 11. CONTROLLING OFFICE NAME AND ADDRESS Same | | 12. REPORT DATE April 1990<br>13. NUMBER OF PAGES 56 |
| 14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office) | | 15. SECURITY CLASS. (of this report) Unclassified<br>15a. DECLASSIFICATION DOWNGRADING SCHEDULE |

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution is unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Mobile Subscriber Equipment (MSE) is the Army's new tactical communications system for Corps and below. MSE is the best example of a successful NDI buy and this paper looks at some of the "lessons learned" from the program. MSE is the largest NDI acquisition the Army has made. It was able to proceed from a 1983 decision to go with an NDI acquisition to award of a contract in 1985. This is excellent when compared to the normal 10-15 year

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

20. ABSTRACT--Continued.

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USAWC MILITARY STUDIES PROGRAM PAPER



# LESSONS LEARNED FROM A SUCCESSFUL NON-DEVELOPMENTAL ITEM (NDI) FIELDING: MOBILE SUBSCRIBER EQUIPMENT

AN INDIVIDUAL STUDY PROJECT

by

Lieutenant Colonel Robert L. Forrester, SC

Colonel Robert Tinsman
Project Advisor



U.S. Army War College
Carrlisle Barracks, Pennsylvania 17013
1990

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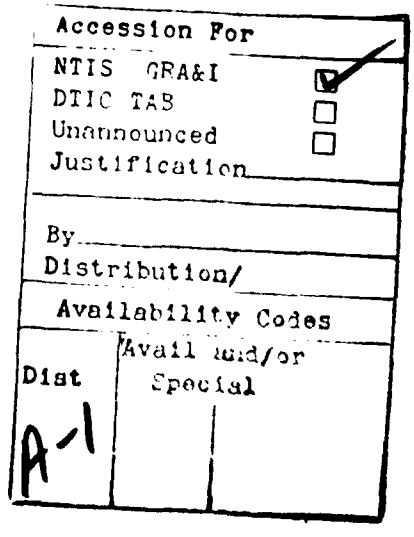

ABSTRACT

AUTHOR: Robert L. Forrester, LTC, SC

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FORMAT: Individual Study Project

DATE: April 1990 PAGES: 53 CLASSIFICATION: Unclassified

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# LESSONS LEARNED FROM A SUCCESSFUL NONDEVELOPMENTAL ITEM (NDI) FIELDING: MOBILE SUBSCRIBER EQUIPMENT

## CHAPTER I

## INTRODUCTION

This paper will discuss the Army's acquisition and fielding of Mobile Subscriber Equipment (MSE) and identify some of the lessons learned that can be applied to the Army's system for acquisition, fielding and testing a new system, especially a nondevelopmental item acquisition. The focus will be on the management of the MSE program from the 1983 Battlefield Communications Review (BCR) decision to go with a Nondevelopmental Item (NDI) acquisition through the completion of the Follow-on Test and Evaluation (FOT&E) in October 1988.

MSE is one of the first Defense Enterprise Programs established by the FY1987 Authorization Act whereby the Project Manager reported directly to a Program Executive Officer. MSE also had consistent Congressional support with approved milestones and funding. [1] It is a $4.5 billion NDI program and the largest tactical communications buy the Army has ever made. [2] General Wagner, the former Army Materiel Command Commander, referred to MSE as the Army's best example of NDI procurement and a good example of an effort to obtain the best available system, saving both time and research and development cost. [3]

MSE uses the "flood search" technology of the French Army's RITA communication system. The use of the French technology, coupled with considerable GTE equipment and software from the

TRITAC communications system, allowed the initial fielding to start just a little over 2 years after the contract award. This was a feat which is unheard of in Army acquisition programs. This was able to happen, because the U.S. Army was able to capitalize on previous French and GTE research and development. MSE is a multinational program, with participation by firms from Canada, France, England, etc. U.S. Congressional support was maintained by insuring that the majority of the buy would consist of U.S. supplied equipment and services (more than 60 percent).[4]

Compared to previous Army plans for acquiring tactical battlefield communications systems, the NDI MSE acquisition and fielding is estimated to save the Army more than $1.5 billion in acquisition costs and over $8 billion in life cycle costs.[5] Additionally, MSE was able to save approximately 5,000 active duty soldier requirements from the US Army's force structure--a good example of how the Army can benefit from the acquisition of advanced technology. MSE was able to proceed from receipt of contractor proposals in October 1984, to initial contract award in December 1985, to a successful completion of the Follow-on Test and Evaluation (FOT&E) in October 1988. This is much better than the normal 10-15 year acquisition cycle.

## ENDNOTES

1. U.S. Department of the Army, Combined Functional Area Assessment (FAA) and DA MSE Action Plan (DAMAP) In Progress Review, for the VCSA, 26 October 1989, p. 1b1.

2. Robert R. Lehnes, "NDI: The MSE Acquisition Strategy," RD&A Magazine, January-February 1987, pp.1-5.

3. General Louis C. Wagner Jr. , "Modernizing the Army's C3I," Signal, January 1989, p.12.

4. John A. Wickham Jr. , Gen, USA (Ret), "Military Requirements and the Defense Industry," Signal, February 1990, p. 23.

5. Daniel J. Marcus, "Army MSE to GTE," Signal, November 1985, p. 7.

CHAPTER II

# THE MILITARY PROCUREMENT SYSTEM

## PACKARD COMMISSION

The 1986 Packard Commission pointed out three typical hazards with the military/DOD acquisition process:

1. The process is too lengthy and this leads to unnecessarily high costs of development. Time is money, and a ten year development cycle is clearly more expensive than a five year cycle.

2. A lengthy process leads to obsolete technology by the time a new system is fielded.

3. Users, knowing that the new equipment designed to meet their requirements is fifteen years away from fielding, make extremely conservative threat estimates. Because long-term estimates are uncertain at best, users tend to err on the side of overstating the threat. [1]

Since the Packard Commission was completed, there has been an easing of tensions between the United States and the Soviet Union. This easing of tensions is changing our view of the world. Many see this political upheaval as an end to the cold war and reason to reduce our large standing Army. This is generating considerable political pressure within Congress to reduce the military budget.[2] NDI acquisition is one way the military can continue to modernize within a shrinking budget.

Technology continues to advance rapidly in the computer, electronics and other high-tech fields. Much of this is essential to the military's command, control, communications and intelligence requirements. Although many fields of technology may require DOD's continued expenditure of research and development funds, much of what the military needs is being developed or has been developed within the civilian market or in foreign military markets.

Political events throughout the world, continued advancements in technology, and the need to reduce the military budget make it imperative that the military change its acquisition process. If the Defense Department's acquisition system is not streamlined, to include the increased use of an NDI strategy where possible, then the military will continue to field systems like The Single Channel Ground and Air Radio System (SINCGARS) with twenty year old technology before it gets into the hands of our soldiers. The Defense Science Board has found that the military buys electronics that are often 5-10 years behind the state of the art and about eight times more expensive. [3]

## WHAT IS NDI?

NDI, sometimes referred to as "Off the Shelf", are an acquisition in which the military procures an item from the commercial sector or an item already fielded in another service or foreign military. This NDI meets or comes close to meeting a recognized need of the military. NDI could be as simple as buying a rifle that the French Army has already fielded or a radio that Motorola makes for the Drug Enforcement Agency. The NDI item that we buy may be ready for fielding as is, may require

some modification before it can be fielded, or like MSE, require some research, development, and software integration prior to fielding. However, in every case the military benefits by taking an already existing system that requires less research and development cost and/or can be fielded in less time than the normal DOD Acquisition system. The acquisition process for an NDI is not a separate process, but a tailoring of events required by AR 70-1, Systems Acquisition Policy and Procedures. [4]

## WHY NDI ACQUISITION?

There has been considerable discussion and many articles written about the need for improving the current Department of Defense acquisition process--especially in shortening the time it takes to develop and field new systems. NDI does shorten the process. NDI is especially suited for electronics and communication applications where civilian technology advances rapidly and commercial products meet most military requirements.

Also, acquisition reforms initiated with the implementation of the Goldwater-Nicholds Act (Public Law 99-433, October 1986) and the Packard Commision Report (NSDD 219, April 1986) were initial steps to improve the Army's acquisition process. These two reforms restructured the Army Secretariat and the Army staff, making the Secretary of the Army the Army Acquisition Executive. They also established Program Executive Officers (PEO) and streamlined the Program Managers' (PM) supervision and decision making chain to the Service Acquisition Executive. The recently completed Defense Management Review (DMR) will also correct perceived problems with the acquisition system. The DMR will result in the formation of an Army Acquisition Corps, review and eliminate unnecessary regulatory requirements, and restructure

test and evaluation organizations and requirements. These changes are in addition to the NDI approach and for the most part compliment NDI procurement.

The challenge for the Army is to keep pace with advances in technology, avoid long research and development cycles, and take advantage of the cost savings. The Army does this by purchasing an available item that may not meet all military specifications and/or requirements, but meets our primary needs. Closer ties between the military and commercial companies and NDI acquisition are methods that can be used to improve the way the military does business.

## COMPARISON OF MSE TO CURRENT DOD ACQUISITION SYSTEM

The Department of Defense (DOD) directive 5000.1 on major systems acquisition and AR 70-1 describe five key decisions points and four phases of activity in the current DOD and Army major systems acquisition process: [5]

1. Milestone 0 Decision: Approval or disapproval of a mission need and the entry into the concept exploration and/or definition phase.

Phase 0: Concept exploration solicitation and the evaluation of alternative system design concepts.

2. Milestone I Decision: Approval or disapproval to proceed into the concept demonstration and/or validation phase.

Phase I: Demonstration and validation.

3. Milestone II Decision: Approval or disapproval to proceed into the full-scale development phase and, as appropriate, low-rate production.

Phase II: Full-scale development.

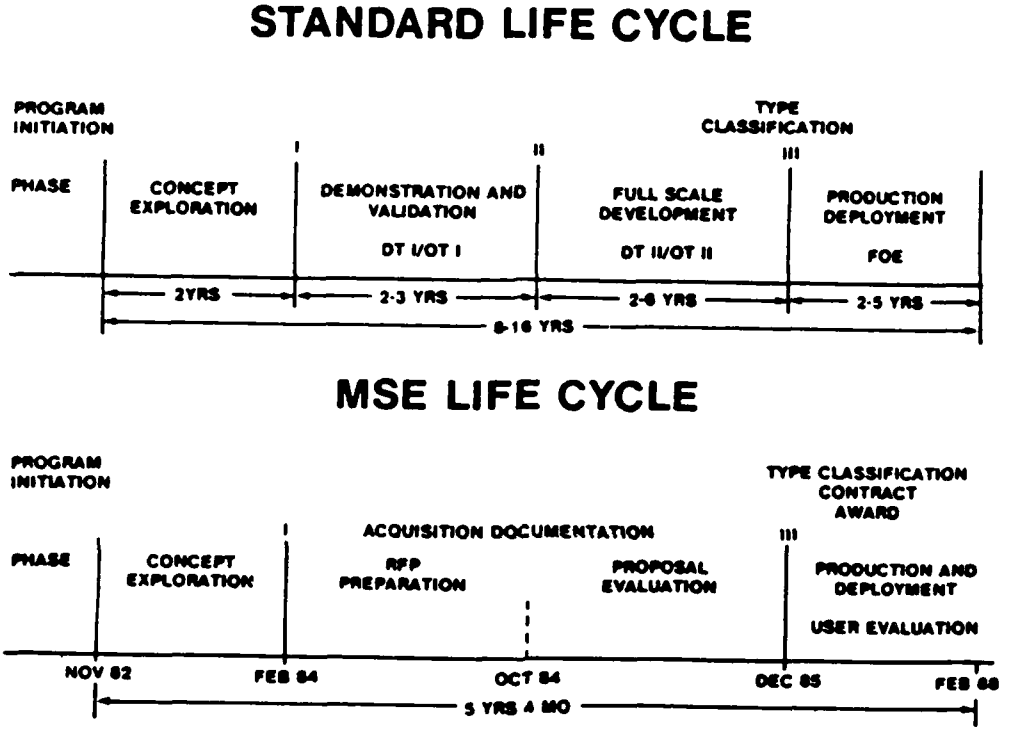
4. Milestone III Decision: Approval or disapproval to proceed into the full-rate production and initial deployment phase.

Phase III: Production and initial deployment.

5. Milestone IV Decision: Encompasses a review one to two years after initial deployment to insure that operational readiness and support objectives are being achieved and maintained during the first several years of the operation support phase.

The current acquisition process is lengthy, detailed, has numerous reviews and considerable system testing requirements. Often this process takes from ten to fifteen years to accomplish. To streamline this process for an NDI buy, AR 70-1 allows for the elimination of the demonstration and validation phase and/or the combining of the demonstration and validation phase with the full-scale development phase. [6] Chart 2 shows a comparison of the standard DOD acquisition life cycle and how the MSE NDI acquisition differs from it.

Chart 2: Comparison of MSE to Standard Life Cycle
Source: PM-MSE




With MSE, the Milestone I decision was basically a memo from OSD to the Under Secretary of the Army which stated that a Defense Acquisition Review Council (DSARC) wasn't needed and left the decision with the Army. Later the Under Secretary directed an NDI procurement. In NDI, you don't need a Milestone II decision. Milestone III is your production decision and type classification--the MSE type classification package was put together by the Project Manager from the results of the source selection board and briefed to the senior advisory council and the Secretary of the Army who had been designated senior selection authority. The decision briefing to the Secretary of the Army was the basis for the Milestone III decision to award the produc-

tion contract and type classify the system. [7]

MSE therefore satisfied in some format the intent of all of the decision milestones required in the standard life cycle management model. This was also true in respect to all of the other requirements in acquisition regulations--NDI doesn't let you avoid much, but it does let you change the timing and the format of many documents. Much of this depends upon the support of key leaders who are able to quickly waiver specific requirements other than regulatory since there is no blanket relief to policy with an NDI program.

## ENDNOTES

1. The President's Blue Ribbon Commission on Defense Management: A Quest for Excellence, Final Report to the President, June 1986, p. 47.

2. Walcott, John, "Does America Need an Army?," US News and World Report, 11 December 1989, pp. 24-27.

3. Bruce B. Auster, "A Healthy Military Industrial Complex," US News and World Report, 12 February 1990, p. 43.

4. U.S. Department of the Army, Army Regulation 70-1: Systems Acquisition Policy and Procedures,. 12 November 1986, p. 28.

5. AR 70-1, p. 28.

6. Robert R. Lehnes, "NDI: The MSE Acquisition Strategy," RD&A Magazine, January-February 1987, p. 2.

7. Lehnes. p. 3.

CHAPTER III

## WHAT IS MOBILE SUBSCRIBER EQUIPMENT?

Mobile Subscriber Equipment (MSE) is a total tactical area communications system where the functions of switching, mobile radio access and trunking, communications security and systems control are integrated into a composite system. MSE replaces the existing command and area communications systems (except for Combat Net Radio (CNR)) from the corps rear boundary forward into the divisions' areas. MSE provides key commanders and command posts down to the maneuver battalion Tactical Operations Center (TOC) with a common user area communications system that includes numerous mobile subscriber terminals in addition to the normal wire line subscriber terminals. MSE provides users with a tactical telephone/radio telephone system that allows them to communicate with each other with capabilities very similar to a commercial telephone system (call forwarding, conference call, etc ). MSE uses a fixed telephone numbering system (area code + seven digit number for each designated user) that greatly simplifies operations for the user. The telephone numbers of the MSE users will not change regardless of their location on the battlefield. [1] A more detailed description of the system and its capabilities can be found in Field Manual (FM) 11-30, MSE Corps/Division Signal Unit Operations; FM 11-37, MSE Primer for the Small Unit Leader; Training Circular (TC) 11-38, MSE System Management and Control; and TC 11-38-1, Signal Tactical Operating Procedures for MSE.

## MSE ACQUISITION STRATEGY

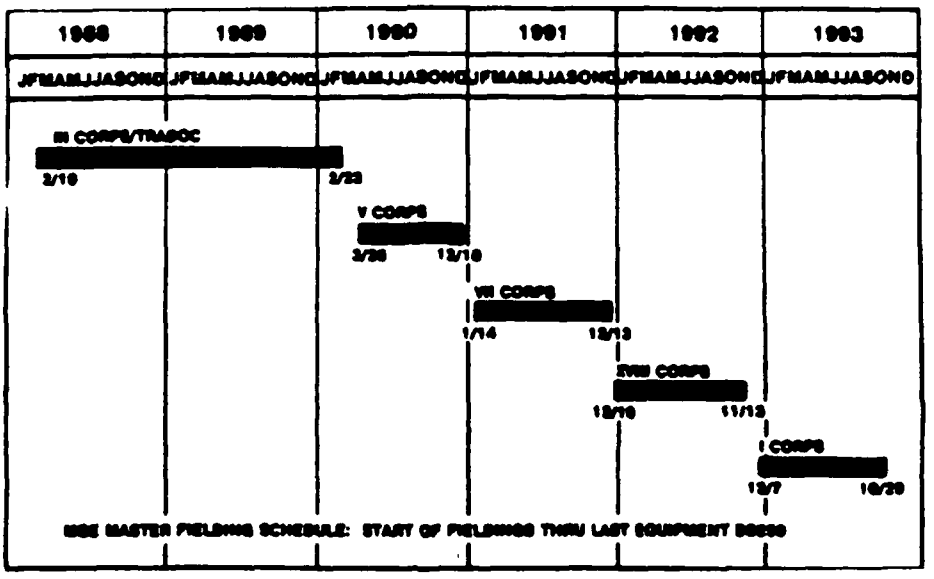
The MSE buy is the first time the Army has purchased a totally integrated communications system. Previous acquisitions have modernized only one component or piece of the Army's tactical communications systems, such as the switchboard or the radio, at a time. This previous method of "piece meal" modernization led to numerous technical problems in signal units. The Army had signal units trying to integrate a new component within currently fielded signal systems (often different generations of equipment) with outdated, conflicting and incomplete doctrinal and technical manuals. This situation made field operations and training difficult at best.

MSE provides both the division and corps with common communications assemblages for the first time. This allows the use of common Military Occupational Specialities (MOS) for both the division signal battalions and the corps signal brigades. Additionally, MSE will be fielded with the Reserve Component (RC) units at Corps and below concurrent with the Active Component (AC) fielding. This will improve and simplify initial entry training. Also, this commonality of equipment and skills should assist in improving the training affiliation relationships between AC and RC units.

The Army plans to buy and field MSE a corps at a time as shown in the schedule at chart 3. This fielding by corps' sets provides tremendous improvements operationally for the Army. By providing the corps' RC units with the same MSE equipment that the AC has, you eliminate the tremendous equipment incompatibility problems that have plagued command, control and communications systems in the past. Programming and fielding new systems,

especially command, control, communications and intelligence (C3I) systems, by division and/or corps sets should be standard practice.

Chart 3: MSE Fielding Schedule
Source: PM-MSE




**The Army is not buying MSE for I Corps-- the FY92-97 POM should better clarify impending force structure changes and reductions. This reduction in force structure will change MSE fielding plans.

## REQUEST FOR PROPOSAL

The initial MSE Request for Proposal (RFP) was prepared in early 1983 for a divisional communications system to augment the planned TRITAC system (a joint service area communications system) that was being procured for Corps and above. Based on the findings of the 1983 Battlefield Communications Review (BCR),

the Army redirected the MSE program to also replace TRITAC at Corps. The Under Secretary of the Army approved the MSE program and directed that the Army procure an available system for Corps and below tactical communications.[3]

Due to the complex nature of the Army's MSE requirement and the uniqueness of the NDI acquisition approach, the traditional Required Operational Capability (ROC) document was not considered appropriate. Instead, an MSE Operational Capabilities Document (MSEOCD) was developed jointly by the combat developments community and materiel developments community. [4]

The MSEOCD defined the general performance requirements that the Army wanted. With this the Army was able to conduct a market survey to insure that systems existed to meet the minimum essential performance and quality requirements. The Army asked contractors to bid existing systems--since the Army's goal was to buy a system "Warts and All".

The RFP contained only five required features or functional areas; however, it also contained numerous desired features to enhance the operational utility of the Army's MSE system as well as many of the normal MIL-Standard requirements. Although many of the desired features were inherent in the contractors' systems, they were not required as a part of the MSE baseline requirement. The five required features were subscriber terminals, mobile subscriber access, wire subscriber access, area coverage and system control. The contractor could bid anything as long as it did those five things. [16]

For the first time, the Army bought a pure and complete system from a single primary contractor. The prime contractor, GTE, had the management load for the 30 sub-contractors that were required to field the system. The Army was not going to government furnish equipment to the contractor. When the contractor delivered the system, he was to deliver everything including the

trucks, generators, tools, manuals, etc. This included logistics support, system fielding, and training (both new system transition training and the initial entry training at Fort Gordon).

The Army's intent was to do a total package fielding. GTE, as the contractor was to deliver a complete system to the receiving unit. The Army also looked at non-MSE equipment shortages for signal battalions converting to MSE. The Army's goal was to insure all units converting to MSE were fielded to Authorized Level of Organization (ALO) 2 for all Equipment Requirements Code (ERC) A items of equipment. The converting units received all of their GTE delivered MSE equipment, however, shortages of key items of equipment such as water trailers, night vision goggles, cargo trailers, and fuel trucks are still unresolved. This could very easily have been the case for generators, trucks, etc if these had not been a part of the MSE total package fielding by GTE.

## SOURCE SELECTION PROCESS

The MSE source selection began with the release of the Request for Proposals (RFP) on 2 July 1984. The Army's receipt of proposals was on 1 October 1984. The final briefing to the Senior Advisory Council (SAC) occurred in August 1985. [5]

The RFP required that the contractors propose total systems (hardware and software) that had been designed, developed, tested and whose principal components were already in production. The RFP also required a field demonstration of the major system characteristics using production equipment in its final offered configuration. The Army did not impose normal logistics and manage-

ment controls, but asked the contractors to propose a system acceptance plan, contractor training, contractor materiel fielding and a proposed configuration management plan. The Army requested five firm fixed price production options, firm fixed price spares for the life of the program, performance warranties and stipulated there would be no progress payments. The contractor also had to include priced options for specified capabilities that the Army might request to be delivered with the system at the original fielding or retrofitted at some appropriate time. These included the use of Army standard support equipment (vehicles, generators, etc), the ability to interface with Army standard and NATO communications systems, and Electromagnetic Pulse (EMP) protection. [6]

There are three separate contracts in the MSE program. First is the basic contract which is a firm, fixed price procurement to field the MSE system with initial spares, ground support equipment, technical data and warranty, plus contractor provided training. The Post Deployment Software Support (PDSS) contract is the second contract. It is fixed price contract to provide all necessary software support for the life of the equipment. Third, is the Integrated Logistics Support (ILS) contract that provides all necessary maintenance and logistics support for the life of the equipment. Unique to the MSE contract is the fact that GTE serves as the depot for MSE system repair parts. GTE also operates regional support centers for maintenance and logistics support at five key locations in the United States and Europe.

Interested contractors were briefed in detail on Army requirements both before and after RFP release. These briefings were necessary because of the unique nature of the NDI process and the RFP. Contractors could bid any proposal that met the RFP requirements--guidance from the Army General Council's office was that the contractors were to propose a "best operational system" and their final system configuration was the contractor's respon-

sibility.

An Executive Committee, chaired by MG T.D.Rogers, was established as a part of the Source Selection Evaluation Board (SSEB). (MG Rogers was the Commandant of the Signal School; however, his knowledge of the program was to be valuable later when he was promoted and became the Director of Information Systems for Command, Control, Communications and Computers (DISC4), HQDA.) This executive committee reported to a Senior Advisory Council (SAC) of nine general officers and 5 senior executive service members from all the key Army elements involved in the MSE acquisition. The SAC was chaired by the CG, Army Materiel Command (AMC). The Secretary of the Army was named Source Selection Authority.

Proposals were received from Rockwell/Collins and GTE on 1 October 1984. The Rockwell proposal also included an alternate proposal with ITT as a major subcontractor plus a teaming arrangement with Plessy Corporation of England. The documentation for each proposal ranged from 40,000 to 60,000 pages.

To properly evaluate these proposals, the Evaluation Board consisted of dedicated, hand picked professionals who were relieved of all other duties during the source selection process. Many of the key personnel on the Evaluation Board had been involved since the beginning and were to become key players in the Project Managers (PM) office, Communications and Electronics Command (CECOM), Department of the Army staff and at the Signal Center.

If possible, the PM and the TRADOC System Manager (TSM) should be a part of the evaluation process during the writing of the MSEOCD and during the evaluation process. The PM should definitely be involved during the writing of the contract. The PM's participation would help him in understanding why the con-

tract was written the way it was. This knowledge would be of tremendous assistance later as he worked with the contractor to fulfill the contract.

NDI programs should have good people involved from the beginning, and these personnel should stay with the program through its fielding--this would avoid unnecessary turbulence on a program that could last only 3 years from RFP to initial fielding. There are numerous cases of this happening with MSE, not only for the civilians involved, but also for key military players like LTG Rogers (mentioned earlier). Additionally, MG Thomas, the Deputy Commandant of the Signal Center when the RFP was written, later served with the office of the Deputy Chief of Staff for Research, Development and Acquisition, and then became the CECOM commander prior to the initial fielding.

The Evaluation Board during its initial evaluation of the written proposals identified major deficiencies, weaknesses and high risk areas. Also, a field demonstration was done of each contractor's "best operational" equipment configuration in the December 1984 to March 1985 time frame. This provided another opportunity to identify deficiencies, weaknesses and risks.

Several outside agencies were allowed to monitor the evaluation effort: The Army Operational Test and Evaluation Agency (OTEA), Army Materiel Systems Acquisition Agency (AMSAA), General Accounting Office (GAO), and the Army Audit Agency (AAA). Their continuous participation was valuable in providing the Office of the Secretary of Defense (OSD) and HQ DA with accurate and timely information on the evaluation and selection process without interfering with the efforts of the Evaluation Team.

Following Senior Advisory Council approval and negotiations with each contractor, a revised Army "best operational system" was developed. Contractor proposals were again requested to satisfy the Army's "best operational system" requirement. When re-

ceived, the contractors proposals were considered final and a the Evaluation Board completed the validation of the Statement of Work and specifications. The Evaluation Board then prepared model contracts which were forwarded to each contractor with a request for their "Best and Final Offer". This preparation of a "Model Contract" prior to the request for a "Best and Final Offer" was a new procedure and helped standardize efforts in dealing with different contractors. [7]

The contractors' "Best and Final Offers" were evaluated between 12-18 August 1985, then immediately briefed to the Senior Advisory Council and the Under Secretary of the Army for decision. The Chairman of the Evaluation Board also briefed other key members of OSD and the Army Staff.[8] The initial contract was awarded to GTE in December 1985.

## TRAINING DEVICES AND TRAINING SIMULATORS

Training devices and training simulators should have been included in the MSE contracts from the beginning. However, they were not a part of the initial MSE contracts and are being handled separately. An Engineering Change Proposal (ECP) to the MSE contract was signed in August 1989 to procure a simulator from GTE to support resident training for node center and large extension switchboard operators and supervisors. The Communications Network Simulator (CNS), phase I, will be installed at Fort Gordon during the summer of 1991. The Army is attempting to procure other simulators to support resident training and unit sustainment training, specifically, the Tactical Communications Simulator (TACCOMSIM), phase II of the CNS, and the Signal Unit Simulator (SIGUS). However, current research, development and acquisition funding supporting acquisition of these training

simulators and/or devices is not available until the FY 93/94 time frame. The problem is that they are required now to support resident training and unit sustainment training. Initial entry training will have been on going at Fort Gordon since May 89. Although this was an issue in the 26 October 1989 Combined Functional Area Assessment (FAA) and DA MSE Action Plan (DAMAP) In Process Review, there is no guarantee that these needed training devices and simulators will be included in future, austere DOD budgets. It would have been much better to have included the training devices and simulators in the basic contract with a delivery date to coincide with the start of initial entry training.

## ENDNOTES

1. William Kelly and LTC Louis Martin, "MSE: An Overview," Signal, Fall 1984, p. 6.

2. CECOM (AMSEL-PL-OP) Memorandum, Subject: Lessons Learned From MSE Program, dated 22 December 1987, pp. 4-5.

3. Kelly and LTC Martin, p.6.

4. CECOM Memo, Lessons Learned From MSE Program, pp. 10-12.

5. CECOM Memo, Lessons Learned From MSE Program, p. 10-14.

6. CECOM Memo, Lessons Learned From MSE Program, p. 9.

7. CECOM Memo, Lessons Learned From MSE Program, p. 13.

8. CECOM Memo, Lessons Learned From MSE Program, pp. 12-13.

CHAPTER IV

# MANAGEMENT INITIATIVES

## DAMAP

The Vice Chief of Staff of the Army approved and implemented a HQDA MSE Action Plan (DAMAP) on 12 March 1986.[1] The DAMAP was implemented to organize the HQDA Staff to effectively monitor and take necessary actions on major MSE issues. This was necessary because of the size of the program and its NDI nature. Because the Army planned MSE for an accelerated fielding, many critical issues had to be staffed, brought before the Army leadership for decision, and implemented in "other-than-the- normal" way of doing business--the DAMAP was the forum that allowed this to happen.

The DAMAP process called for semi-annual briefings to the VCSA. The briefings to the VCSA took place following a series of meetings to weed out, resolve and firm up issues at the action officer, Council of Colonel and General Officer Steering Council (GOSC) levels. Fortunately many issues were resolved prior to the formal presentation to the VCSA. As of 26 October 1989 there had been seven DAMAP IPRs to the VCSA.

The Director of Information Systems for Command, Control, Communications and Computers (DISC4) is the HQDA executive agent for the DAMAP. The Project Manager and the TRADOC Systems Manager play key roles. The MACOMs are in supporting and executing roles. The DAMAP Functional Area Responsibilities (e.g.: personnel, logistics, training, acquisition, funding, facilities, organizational structure, fielding, etc) were assigned to specific proponents in the Army Secretariat and/or Army Staff.

The DAMAP process is an excellent way to raise issues to the appropriate decision making level for resolution. The MACOMs played a key role in bringing forth issues--not only their own, but those of the CINCs they support. Without this valuable forum, the fielding of MSE and the successful FOT&E would have been much more difficult, if not impossible.

## LESSONS LEARNED FROM FOREIGN FIELDINGS

In early 1985, while the source selection process was on going, the Deputy Commandant of the Signal Center, BG Peter Kind headed a team of training, personnel management, logistics and combat developments personnel from HQDA, Army Materiel Command, OTEA, The Logistics Center, Soldier Support Center-National Capital Region and the Signal Center to study how similar tactical communications systems had been fielded in other countries. The team traveled to Europe in January 1985 to learn of experiences that the French Army had in fielding RITA and that the British Army was having in fielding their PTARMIGAN system. Functionally, both of these communications systems are very similar to the U.S. Army's MSE system. The team meet with the respective materiel developers, combat developers, trainers, contractors, Ministry level staffs and field units that had the RITA and/or PTARMIGAN systems.

The after action report from this effort was forwarded to LTG Skibbie, the DCG for Materiel Readiness, AMC in March 1985. The report was also widely disseminated to key players within the U.S. Army. [2] This effort proved to be very helpful in developing MSE personnel support plans, developing training programs, writing initial doctrinal publications, developing logistical

support concepts and in knowing what to expect during initial fielding and testing of a sophisticated, software intensive system.

Although the scope of this lessons learned mission was very broad, it was an excellent way to start getting key personnel up to speed on what the Army had to do to make MSE a reality. Many of the team personnel remained with the MSE program and were able to take advantage of what they had learned. The report was also very beneficial to senior leaders at DOD and Army staff level. The report also provided an understanding of the readiness impacts on the units during fielding, and possible doctrinal changes the new system would require of the Army.

## TSM REORGANIZATION

Normally the TRADOC Systems Manager (TSM) is staffed with only a small staff of five personnel and receives matrix type sup port from the Director of Combat Developments, Director of Training, etc at the associated TRADOC School. For the MSE fielding effort, the TSM-MSE was reorganized and his staff increased to twenty-seven personnel in February 1987. These additional personnel were attached to the TSM-MSE from other departments within the Signal Center and were formed into a Training Branch, a Systems Branch and a Logistics Branch. The Signal Center started slowly reducing the size of the TSM-MSE staff in early 1989, after completion of the October 1988 FOT&E. The reduction in staff size was tied to the reduction of work load as training programs were finalized, logistics concepts approved, etc. The personnel were returned to their normal staff matrix support organizations.

This increased staffing within the TSM-MSE office allowed the necessary dedicated focus that a fast paced NDI type fielding needed. The TSM-MSE had to work closely with the PM-MSE, GTE, other TRADOC schools, the units to be fielded, Army Research Institute, Rand Corporation, etc. There was little time available to insure that personnel requirements, training programs and publications, doctrine, organizations and MSE FOT&E test criteria were completed in time for the initial fielding at Fort Hood Texas in February 1988.

The Director, Operations, Evaluation and Standardization (DOES) was given the lead for collecting and disseminating MSE lessons learned at the Signal Center and developed a data base of lessons learned that is available for field units and others to access.[3] However, the technical expertise for reviewing this data base resides with the TSM-MSE and the TSM had to assist in the development of the lessons learned.

## MANUALS

The contractor provides the technical manuals, training lesson plans, exportable lesson plans, etc that support the MSE fielding. However, the Army provided GTE considerable assistance and expertise in completing the task. The documents produced by GTE include about 256 new systems training and initial entry training lesson plans, about 217 exportable training lesson plans and 85 technical manuals. The amount of effort that went into this process was enormous. Most documents were reviewed and updated several times, always with short suspenses. The result was that fairly good, but draft documents were available for the initial fielding. These draft documents were scrutinized closely during the initial fielding and the FOT&E that followed. GTE

made necessary changes and republished the documents prior to follow-on fielding efforts.[4]

Additionally, the Signal School formed a special staff in its Leadership Department to develop and conduct MSE doctrine and tactics training for signal soldiers and to write the draft doctrinal publications that the Army would use for the initial fielding and the FOT&E. This group, although not a part of the TSM-MSE task force, was closely supervised and assisted by the TSM-MSE. The initial doctrine and tactics training for the 1st Cavalry Division was presented in December 1987. This Signal Leadership Department group still does these doctrine and training missions for each unit to be fielded and also teaches MSE to the Leadership Department students at the Signal Center. The non-signal doctrine and tactics training was developed and is being conducted by personnel at the Command and General Staff College at Fort Leavenworth.

The training lesson plans for the new systems training courses that was presented to the 1st Cavalry Division was a GTE product. However, as mentioned earlier, there was considerable assistance from the Signal Center, the PM-MSE and a CECOM new systems training team. To evaluate and improve the training programs prior to formal start of the 1st Cavalry Division' straining, a method was developed whereby target audience soldiers were provided as students for the first GTE course rehearsals and/or presentations. These presentations were evaluated by the Army and GTE and improvements made to the courses. The target audience soldiers were from installations and units throughout TRADOC and FORSCOM--the Army would have been better served if they had been soldiers from the 1st Cavalry Division. The first unit to be fielded would have a greater interest in the quality of the training they were to receive. Also, the spin-off training benefits of their participation, especially the hands on equipment training, would have assisted later as the actual fielding and training programs were taking place.

## BASELINE COMPARISON

One of the important documents that was developed by the TSM-MSE was a Baseline Comparison for the MSE Program. The study, dated 16 March 1988, compared MSE to the current tactical communications systems and was a key document used by The Operational Test and Evaluation Agency (OTEA) in conducting its Follow-on Operational Test and Evaluation (FOT&E). The study contained a comparison of personnel and training costs (accomplished by TRADOC Analysis Command (TRAC)), a user instrument and system capabilities analysis, and an analysis of currently fielded area communications systems at Corps and below. This effort was closely coordinated with the PM-MSE, the Army Staff, the 1st Cavalry Division and OTEA. OTEA also collected data on baseline system performance (assemblage installation times, etc) of currently fielded systems during the 3d Signal Brigade's and 13th Signal Battalion's participation in REFORGER-87. [5] This type of system comparison (current system to new system) is an excellent and meaningful way of looking at the value added and/or impact of a new system.

## THE BERGQUIST REPORTS

To provide additional management oversight and assistance, the Army contracted with LTG (Ret) Robert L. Bergquist to do an examination of the MSE program's management structure. LTG (Ret)

Bergquist looked at management of the program by both the Army and the contractor, GTE.

The quarterly Bergquist reports were an excellent source of information, not only to the Army and DOD leadership, but to everyone involved in the program. It helped to have a qualified outsider take an informed and critical look at how the program was proceeding. The assistance he provided was quickly acted upon and often led to corrective actions by the Army and GTE. [6]

## III CORPS MSE FIELDING TEAM

Taking a lesson learned from the Apache fielding effort, the Army authorized sufficient Directed Military Overstrength (DMO) to establish a team of nine officers, four warrant officers, 14 enlisted soldiers and three civilians at Fort Hood, Texas. This team was activated in August 1987 to support the fielding of MSE to the III Corps, by providing direct coordination between the units being fielded (active and reserve), the PEO/PM-MSE, FORSCOM, CECOM, the Signal Center and OTEA.

The team was headed up by a Colonel and was organized into a personnel branch, an operations/training branch and a logistics branch. The task force also had National Guard liaison officers assigned.

The worth of this team should not be underestimated. It provided a "one stop shop" to funnel issues and requirements between the different players and was a tremendous source of quick information for senior officials at the DOD level, HQDA, the MACOMs, etc. It also was able to insulate the unit being fielded from many unnecessary administrative/protocol requirements and

was a responsive action agency for the III Corps commander in resolving issues. This team, in conjunction with the PM-MSE and the contractor (GTE) opened and ran a visitors center for the tremendous number of high ranking dignitaries who came to check up on the status of the fielding effort. This team became the lead in capturing and documenting lessons learned from the training and fielding that would be applied to future fieldings. Such a team, staffed with quality personnel, is a must for major fieldings. Similar MSE fielding teams have been formed in Europe for the V and VII Corps. Key personnel from the European fielding teams have visited Fort Hood, learning what will be expected of them and the best way to plan for and handle anticipated "stress points" associated with the fielding of MSE.

## ENDNOTES

1. U.S. ARMY, HQDA (DAMA-CSC) Action Memorandum: HQDA Mobile Subscriber Equipment (MSE) Action Plan, dated 4 March 1985, approved by VCSA on 12 March 1985.

2. Signal Center Memorandum (ATZH-CDM), Subject: RITA/PTARMIGAN Lessons Learned Visits-Trip Report, dated 19 June 1985.

3. Signal Center Memorandum (ATZH-ME), Subject: Mobile Subscriber Equipment Fielding, dated 8 October 1987.

4. Briefing to CG TRADOC, MSE Training Strategy, September 1988.

5. Report: IER-FO-1148, by US Army Operational Test and Evaluation Agency, "Independent Evaluation of the Mobile Subscriber Equipment (MSE)," 27 April 1989.

6. CECOM, Lessons Learned from MSE Program, p. ii.

CHAPTER V

# FIELDING EFFORT

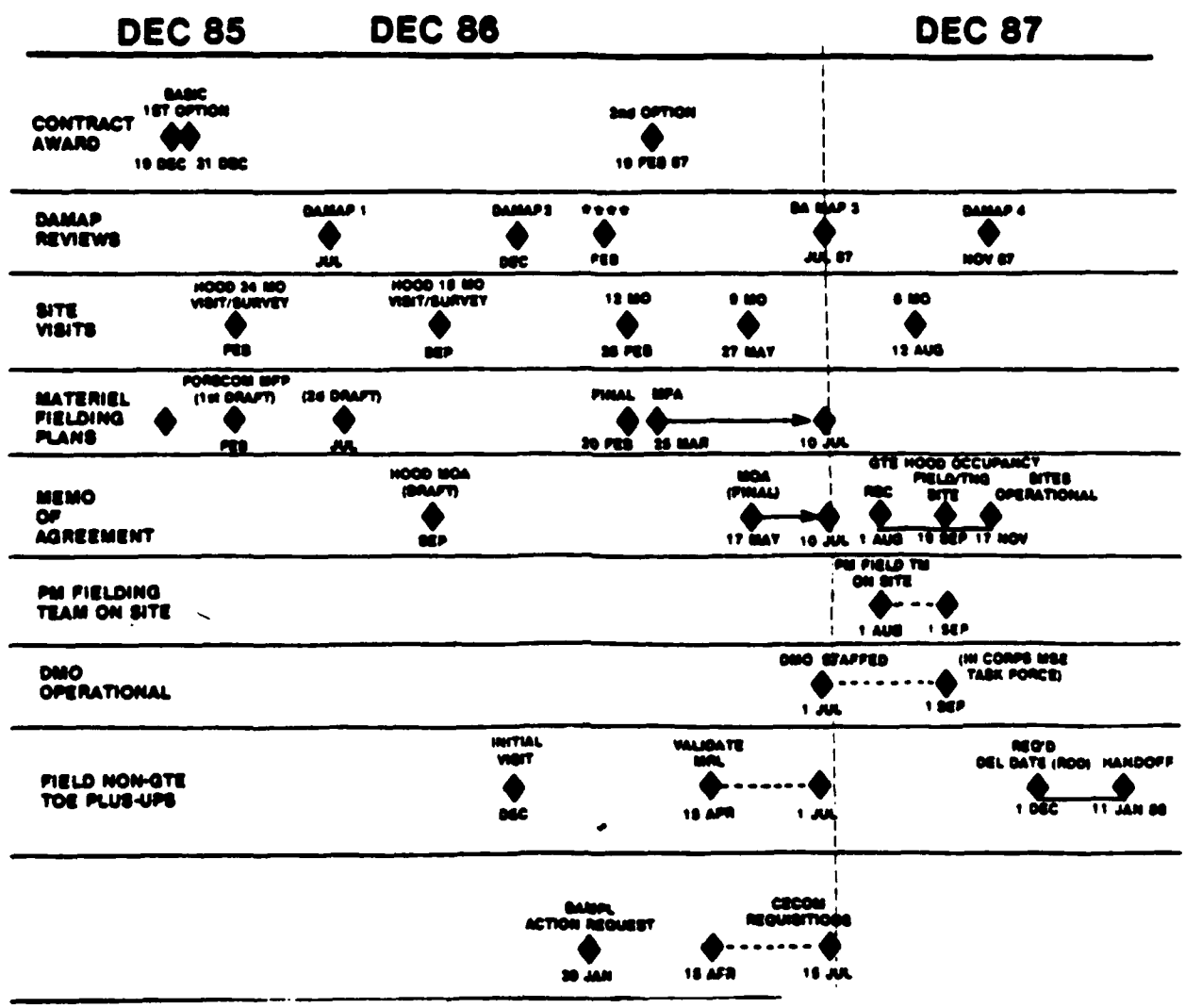
The list of MSE pre-fielding activities is extensive and very key to the successful fielding. The publication of Materiel Fielding Plans, composition and staffing of on-site fielding teams, freezing of approved Modified Tables of Organization and Equipment (MTOE) are just a few of the necessary tasks that must be accomplished. Planned site visits is one way to coordinate theses actions.

Site visits are valuable for coordinating training classrooms, fielding sites to store the new equipment, handoff procedures to the gaining unit, land to conduct field training exercises (this is a serious issue in Europe), arranging for support and transportation, radio frequencies, office space, food, etc.

As shown in chart 4, MSE is a fast paced fielding effort and these pre-fielding actions and necessary memorandums of agree ment had to be accomplished quite rapidly. This was especially true for the 1st Cavalry Division, since the contract was awarded in December 1985 and the fielding started in February 1988. The unresolved issues from the site visits were fed into the DAMAP process for resolution.

Chart 4: Pre-fielding Activities

Source: PM-MSE




The site visits took place at specific intervals--24 months, 18 months, 12 months, 6 and 3 months prior to fielding

for both AC and RC units. These visits included key representation from HQDA, PM-MSE, GTE, TSM-MSE, the MACOM staff, OTEA, AMC as well as key commanders and staff of the unit to be fielded and the installation staff. The site visits usually started with briefings by the PM-MSE and GTE, then broke up into workgroups covering materiel fielding plans, unit readiness, logistics, land requirements, training, equipment capabilities, etc. Each workgroup backbriefed the entire group at the end, covering what it accomplished and unresolved issues. The PM then published a message on the meeting results with assigned responsibilities.

The visits provided the necessary forum for the resolution of problems and the signing of necessary agreements between the Army and GTE. They allowed interaction by all key players, especially the unit that is about to be fielded. The site visits helped insure the success of the first fielding to the 1st Cavalry Division--there were few surprises during the fielding and all the key players already knew each other. The lessons learned from the initial fieldings were incorporated in the site visits to subsequent units.

## INITIAL FIELDING

The 1st Cavalry Division commander, the III Corps commander, and their staffs were actively involved with the MSE fielding at the DAMAPs, at the site visits and meetings at TRADOC, GTE, etc. Advance copies of all MSE FMs were provided to them. During this period, the 1st Cavalry Division greatly assisted the Army by conducting an indepth review of the Army's Operational Facility (OPFAC) rules for authorizing MSE user instruments, and how these were to be used in each of the battlefield operating systems. A report of the Division's analysis was

provided to the Command and General Staff College and the Signal Center in May 1988. [1] This input was used to update OPFAC rules and also assisted TRADOC in publishing a "Corps and Division Commander's Handbook on MSE". This is just another example of the good things that happen in a new system fielding by the active involvement of the field unit.

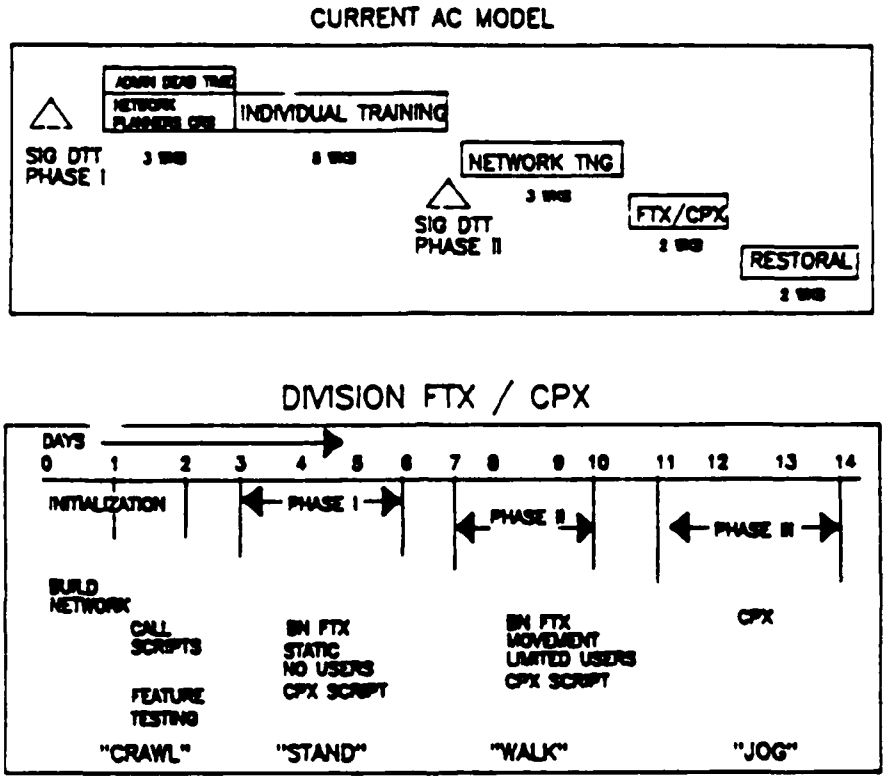
MSE is not a new system just for the signal battalions. Its user owned, installed and operated instruments were to be fielded to every unit in the division, to include the division's National Guard Roundout brigade. Therefore, the leaders and users of the new equipment throughout the division had to be trained and not just the signal soldiers.

The training program for the signal battalion (chart 5) moved from individual training, to team network training, to collective training, with the final event being a division command post exercise (CPX). The division CPX was the primary opportunity for the division commander to evaluate his division's training and the MSE system, before reporting on their readiness to proceed to FOT&E.

The fielding of any major system like MSE will be very disruptive to the division and a major time consumer for much of the division's key leadership. Both the CPX and the FOT&E involved the leadership of the entire division. Also, the readiness rating of the division was affected during the entire transition to MSE. The same effort will be required with some of the Army's future systems like Enhanced Position Location and Reporting System (EPLRS), the All Source Analysis System (ASAS), etc.

Chart 5: Training Plan

Source: Combined FAA and DAMAP IPR to VCSA, 26 OCT 89




## EVALUATION OF TRAINING

During the GTE conducted new systems training period, a thorough evaluation of the training courses and documents was conducted by the Signal Center in conjunction with the CECOM New Systems Training Division. Each and every course taught was monitored and scrutinized. Changes and additions were made as necessary. The Army and the contractor formed a very close working relationship and greatly improved the new systems training

prior to the second fielding. Lessons learned were also applied to the initial entry training courses.

## FIND AND FIX

The key during the period, starting with the first signal battalion only Field Training Exercise (FTX), was to insure that the MSE system did not proceed to the FOT&E until everything was ready. The division had to be adequately trained and organized, and the MSE system had to be operationally capable of meeting the division's tactical needs. As problems arose, corrections and fixes were made, then the events were repeated. The 1st Cavalry Division conducted three CPXs before the Division Commander felt the system was ready. One of the problems that the 1st Cavalry Division had was its need for an easily measured set of tasks, conditions and standards that the Division's leadership could use to measure progress. The division signal battalion (MSE) ARTEP manual did not meet their needs. The ARTEP manual primarily focused on individual equipment assemblages and not command post signal support. What was needed was a document that defined the tasks, conditions and standards that are required by the signal support element of the DISCOM, the Division Command Post, an area signal node, a brigade CP, etc. Such standards were developed by the Signal Center and provided to the 1st Cavalry Division--they focused on providing subscriber service and worked very well. Such collective tasks, conditions and standards should be incorporated into the ARTEP manuals for all signal units.

The Deputy Commandant of the Signal Center ran three "Verification Trials" during the May-July 1988 timeframe to verify fixes to problems that had been identified--these problems were considered significant enough each time to prevent MSE from

proceeding to CPX/FOT&E until they were corrected. The "Verification Trials" also provided an opportunity to review the test equipment and procedures that OTEA was going to use during the actual FOT&E, and evaluate the training of the OTEA personnel. Since computers were used extensively in lieu of live subscribers to stimulate the MSE, considerable effort had to go into insuring that there was software compatibility between the OTEA computers and MSE. It was imperative that GTE, OTEA, PM-MSE, Signal Center and the test unit work as a team to resolve conflicts, especially technical problems. All must feel confident about the ability of the test instrumentation and the tested system, MSE, to function together allowing the collection of factual test data. Similar situations can be expected to arise during the testing of other new software based command, control and communications systems, such as EPLRS, ASAS, etc.

This period of identifying problems, fixing them, then verifying the fixes with a CPX or "Verification Trial", required the personal involvement of the combat developer, the materiel developer and the leadership of the 1st Cavalry Division's test unit. Key personnel had to be present to identify and prioritize fixes and insure adequate resources were made available. In the case of MSE this included long term "on-the-ground" participation by the Deputy Commandant of the Signal School, the PM-MSE, the Program Executive Officer (PEO), the OTEA Test Director, and GTE corporate leadership/engineers. This allowed for quick decisions and fixes with as little impact as possible on the soldiers of the 1st Cavalry Division.

During this period of "find and fix", training was improved, the soldiers were much more confident of their capabilities, software and equipment fixes were made to MSE, and everyone was more confident of the test and evaluation methodology and scoring process. The system was announced as ready to proceed to the FOT&E at the Operational Test Readiness Review (OTRR) on 9 August 1988. [2]

## THE SOLDIERS

No one wanted to "burn out" the soldiers of the unit that would take the equipment through the test and evaluation. The welfare of the soldiers and their families must be considered at every decision point. However, there was considerable pressure to insure the MSE system and the 1st Cavalry Division were ready, and then quickly start the FOT&E. It would be very easy in such situations to work the soldiers each and every weekend for months on end. For example, the soldiers of the 1st Cavalry Division's signal battalion were a part of all events in the "find and fix" period and most of their time was spent in a field environment working 24 hours each day. For them, the decision to proceed to FOT&E meant the beginning of an intensive and demanding effort that would last through the summer to 25 October 1988.

## FOLLOW-ON OPERATIONAL TEST AND EVALUATION

The Follow-on Operational Test and Evaluation (FOT&E) of MSE took place at Fort Hood Texas from 9 August 1988 through 25 October 1988. The results of the FOT&E report, which were published in April 1989, were an important consideration in the Army's decision to exercise Option Year 3 of the basic MSE production contract. [3]

The Operational Test and Evaluation Agency (OTEA) conducted the FOT&E as a part of its "Continuous and Comprehensive Evaluation" of the MSE program. The MSE Test and Evaluation Master Plan (TEMP) was approved by HQDA in June 1987, although OTEA had

been involved since the MSE RFP in 1984.

OTEA had been involved with its "Continuous and Comprehensive Evaluation" during the product assurance, production reliability acceptance, shelter product acceptance and destination final acceptance testing of MSE components and assemblages. Because MSE was NDI, there were no series of Technical Tests (TTs), or Essential User Tests and Evaluations (EOT&E), etc. OTEA also was involved with the MSE training and fielding to the 1st Cavalry Division. However, the FOT&E was the first system level evaluation of a complete division set of MSE.

The evaluation strategy was tailored since MSE was an NDI acquisition that the Army wanted to field quickly. As such, there was a time constraint to complete the FOT&E in a specified time. The results of the FOT&E were needed in October to support an Option Year 3 contract decision as a part of the Program Objective Memorandum (POM) development. If the system did not do well, the Army could elect not to purchase additional equipment.

The FOT&E was conducted in three major phases: Phase 1 was a pilot test, Phase 2 was the record test, and phase 3 was a division command post exercise. All phases were conducted in a realistic tactical environment at Fort Hood. The test and evaluation were very demanding of the MSE system, the unit going through the test and the other personnel involved. OTEA required approximately seven hundred personnel to conduct the FOT&E. If OTEA had not used considerable automated support for the FOT&E, the number of people required to conduct the test and evaluation could have easily doubled.

Of note was the fact that the General Accounting Office (GAO) established a team within the OTEA test headquarters at Fort Hood for the duration of the FOT&E. The GAO personally witnessed the conduct of the test and evaluation first hand. This allowed them to make a knowledgeable and timely report of the

FOT&E to the House of Representatives' Subcommittee on Procurement and Military Nuclear Systems, Committee on Armed Services in July 1989. [4]

Once started, the FOT&E went smoothly. This was in no small part due to the efforts that had taken place during the May-July time frame as problems were identified, fixes made and then verified. These "find and fix" period field exercises trained everyone on what their role was allowing the Army and the contractor to resolve differences of opinion on the test and evaluation methods, definitions, and standards. An example of the type problem experienced was the need for all parties to agree on the definition of what is being measured.

The favorable results of the MSE FOT&E led to an Army decision to purchase Option Year 3 of the MSE contract and continue fielding. The system was found to be much better than previous systems and easily met most of the Army's requirements. [5]

## MSE CORRECTIVE ACTION PLAN

The MSE system did not satisfactorily perform in all areas during testing and efforts started immediately to prioritize "fixes" and improvements to the system. An MSE Corrective Action Plan was developed whereby funds could be withheld from the contractor if improvements/corrections are not made to the system. To evaluate required fixes, OTEA will conduct another Test and Evaluation of the system at Fort Hood in early 1990.

The MSE contract provides adequate authority to protect the Army from paying the full price if the MSE's performance was below contracted requirements. The corrective action plan identi-

fies MSE improvements by block and had definite test and evaluation standards for evaluating each block improvement and/or correction. The Army had the authority to withhold up to $259 million in total, if the contractor failed to meet all corrections and /or improvements.[6]

## IMPROVING THE SYSTEM

The completion of FOT&E and the analysis of its findings is the logical place to develop a prioritized list of Pre-planned Product Improvements (P3I) and corrective product improvements. Anytime a new system is fielded, there will be corrective action required, in addition to an identification of enhancements that are desired for the system. The Army must plan for continued system improvements, especially with software intensive systems. However, the Army leadership must guard against "gold plating" the system. Everyone will come up with a good idea; however, most will not be necessary for the new system to function against the current and projected "threat".

## REQUIREMENT DOCUMENTS

Although desired, the ability to clearly articulate Army requirements during the development of an Operations and Organization Plan (O&O Plan) and the subsequent Required Operational Capabilities (ROC) documents should not be expected--technology, organizations, doctrine, national strategy and key

people will change before the system is fielded. If system requirements are too stringent in the O&O Plan and the ROC, industry may have trouble meeting it technology wise, or the system could enter testing and be "killed" because it is unable to meet performance requirements. If system requirements are too soft, then you could end up with an inferior system that meets requirements, but will not defeat the "threat"--requiring extensive enhancements/modifications to be effective on the battlefield. TRADOC and DCSOPS need to work closely with the combat developments and materiel communities to make changes to O&O plans and ROCs when necessary. Senior leaders must review these documents to insure they are articulating what the Army needs and not leave this task up to well meaning, but inexperienced individuals. However, after a system goes into production, changes to the requirement document/equipment should be avoided until the new system goes through a test and evaluation--this would provide everyone with a better feel of what and how to improve the system.

The proper writing of O&O plans, ROCs and Test and Evaluation Master Plans (TEMP) was a serious topic of discussion at the Command and Control Symposium, 14-15 June 1989, at Fort Leavenworth.[7] The symposium reviewed the tactical automated command and control systems being developed for the Army, and the communications systems that would support them. It was attended by general officer and other key leaders from the materiel developer community, the combat development community, and HQDA. The idea of developing O&O Plans and ROCs with "block" requirements that proceed from a minimum acceptable capability to an objective acceptable capability was debated. The concept being that current technology is needed in the military and we must be willing to accept what industry is capable of providing and not dictate unattainable requirements. However, the new system should be developed with the understanding up front that it will be product improved through "block improvements" until it reaches an desired objective capability. This type of approach would fit

with the current testing philosophy of "continuous, comprehensive evaluation"--a system could proceed through the initial test and evaluation gates with test conditions and criteria based on an approved current "threat". This would allow the Army to field a needed capability to our soldiers that we know will be improved over time as the "threat" also improves.

## CURRENT MSE SYSTEM STATUS

A combined Functional Area Assessment (FAA) and DAMAP In Process Review was presented to the Vice Chief of Staff of the Army (VCSA) on 26 October 1989. [8] The MSE program is proceeding on schedule. The system has been fielded to the 1st Cavalry Division, the 3d Signal Brigade, the 2d Armored Division, the 4th Infantry Division, and the 49th Division (TXARNG). Fielding is ongoing with the 5th Infantry Division and the 8th Infantry Division. The Block Improvement Program is progressing satisfactorily and OTEA is conducting a test and evaluation of the Block 1 improvements at Fort Hood starting in February 1990.

The current funding of the MSE program is shown below. The Army has awarded Option Year 4 of the contract. The program will undoubtedly be affected by reductions in the Military budget and reductions in force structure in FY91 and beyond. However, these still emerging changes are beyond the scope of this paper.

Chart 1:MSE Funding (OPA)

Source: Combined FAA/DAMAP brief to VCSA on 26 October 89

| | FY85 | FY86 | FY87 | FY88 | FY89 | FY90 | FY91 | FY92 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| DIVISIONS | 1 | 0 | 5 | 5 | 8 | 7 | 0 | 0 | 26 |
| SEP BDE/ACR | 0 | 0 | 5 | 2 | 6 | 3 | 0 | 0 | 16 |
| CORPS (AREA SUPPORT) | 0 | 0 | 3 | 6 | 3 | 3 | 0 | 0 | 15 |
| SIG BNS (AREA SUPPORT) | 0 | 0 | 2 | 1 | 1 | 1 | 0 | 0 | 5 |
| TRAINING SETS | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 2 |
| REQUIRED (M$) | 63.3 | 335.3 | 903.7 | 1019.8 | 991.1 | 984.7 | 345.6 | 0 | 4643.5 |
| APPRVD FUNDS (M$) | 63.3 | 335.3 | 903.7 | 1019.8 | 991.1 | 984.7 | 68.6 | 0 | 4366.5 |

ENDNOTES

1. U.S. Army, 1st Cavalry Division Memorandum (AFVA-GC), Subject: 1st Cavalry Division MSE Distribution and Use, dated 6 May 1988.

2. Operational Test Readiness Review, Ft. Hood Texas, 9 August 1988.

3. U. S. Army OTEA, Independent Evaluation of MSE by the Operational Test and Evaluation Agency, 22 April 1989.

4. GAO Report to the Honorable Les Aspin, Chairman, Subcommittee on Procurement and Military Nuclear Systems, Committee on the Armed Services, Follow-on Operational Test and Evaluation for Mobile Subscriber Equipment, 6 July 1989.

5. Independent Evaluation of MSE, OTEA, 27 April 1989.

6. GAO Report, 6 July 1989.

7. Command and Control Symposium, Fort Leavenworth, Kansas, 14-15 June 1989.

8. Combined Functional Area Assessment (FAA) and DA MSE Action Plan (DAMAP) In Progress Review for the VCSA, 26 October 1989.

CHAPTER VI

# CONCLUSION: MAJOR LESSONS LEARNED

Important lessons learned from the MSE program include the following:

**NDI acquisition works and should be used whenever possible.** NDI acquisition appears to be an excellent and cost effective way to meet Army materiel requirements. This is especially true for command, control and communications systems where the civilian sector has similar needs. Procuring NDI command, control and communications systems allows the military to remain current with new technology, while at the same time saving considerable research and development cost. MSE is the Army's best example of NDI and a good example of an effort to procure the best available system. [1]

**Stable funding and congressional support are necessary for any program, even NDI.** Funding must be stable to avoid turbulence and to take care of unexpected contingencies. Both GTE and the Army have had to work with HQDA, DOD and Congress to keep the program on track, even though MSE was a Defense Enterprise Program. Also, NDI programs must have the flexibility to accommodate growth and the insertion of new technology within the system's architecture, hardware and software.[2]

**A system for involving the senior Army leadership in the management of an NDI system is necessary to overcome bureaucratic bottlenecks.** MSE had the DAMAP process to routinely handle problems beyond the capability of the PM, PEO and /or TRADOC

school to resolve. Once fielding started the Incident Resolution Process was established to obtain necessary decisions. Even with the initiatives that Secretary Cheney is trying to make with the Army Management Review, there may still be numerous unnecessary regulations that will hinder the testing and fielding of NDI systems.[3]

**Good people must be selected for the program and remain with the program.** With MSE many of the key players from the Source Evaluation Board, the European Lessons Learned study have remained with the MSE program at either AMC, TRADOC or key HQDA assignments. Many moved from one job to another, but still associated with MSE--this allowed for necessary continuity. Such continuity reduces turbulence and greatly enhances any program, especially a fast paced NDI effort.

**Staff critical positions as necessary.** Increasing the staffing of key agencies/staffs such as the TSM-MSE and the Project Manager should be considered. Also, the formation of well staffed Fielding Offices like the MSE Corps Fielding Teams (learned from the Apache fielding) are necessary. Seek directed military overstrength positions if necessary.

**Market investigation and knowledge are necessary.** The combat developer and the materiel developer must work closely together when requirements documents are being written. Unfortunately, the combat developer normally doesn't know what technology is available in the market. Therefore, if the combat developer and the materiel developer don't work together, then a situation could arise whereby the requirements documents are always so demanding that current technology could never be used. This could lead to an unnecessary expenditure of research and development cost and long term system development and fielding. This is especially true for NDI, since the goal in NDI is to obtain equipment and technology that satisfies user requirements.

Write the NDI requirements documents with performance parameters that industry can be expected to attain in the near future. [4]

**Avoid "gold plating" new systems.** There also must be constant vigil to insure that unnecessary changes in technical requirements and/or "gold plating" of the NDI system does not take place.

**Use of a Model Contract in negotiating contractor's "best and final offer" should be standard practice.** This not only speeded up the process, but allowed the Army to focus on the key capabilities that were desired of the system.

**The use of financial penalities for the contractor should be standard practice.** If during test and evaluation, the system does not meet contracted requirements, the Army should have a way of penalizing the contractor.

**"Total Package Fielding" by the contractor works.** GTE provided a complete system to the Army that included trucks, generators, manuals, training, etc. This allowed the contractor to bypass the Army bureaucracy on obtaining shortage items such as vehicles and go straight to the vehicle manufacturer. As a result there have been no delays due to shortages of key items, even though many are standard Army inventory items. The training aids and simulators should have also been part of the same contract--may have avoided problems in the Army having to compete for funds separately on a key part of the entire MSE program.

**New systems should be purchased and fielded by unit sets.** MSE was purchased and fielded by Corps. This ensured that all the units that would fight as a part of that Corps, both AC and RC would go to war with the same equipment. This also improves training for the corps, by providing common MOS and equipment .

**Draft manuals are acceptable for the initial fielding.** When fielding a new system, especially a fast paced NDI system, the Army is better off doing the initial fielding and all test and evaluations with draft technical manuals, draft training plans and programs of instruction, and draft field manuals. After the first fielding and a "shake out" of the system, everyone knows more about the system, its capabilities and limitations, and its affect on how the Army fights--with this increased knowledge to rewrite the documents. It may take several iterations of these new documents to obtain the quality needed, but with today's printing capabilities that is not a problem. Using the contractor to write/publish these documents is also a good idea.

**Get the user, especially the first unit to be fielded involved as soon as possible.** This may require additional staffing for the first unit fielded and possibly careful selection of the personnel assigned to that unit. The user's involvement is necessary because he is more current and knowledgeable about what is needed operationally than anyone. The user also has a vested interest in becoming a part of the new system fielding process. Involve the unit in the "target audience" evaluation of technical manuals, manprinting of the equipment design, and initial trial runs of training classes, etc. This is beneficial to both the soldiers involved and the agency responsible for the finished products. By using the soldiers from the actual unit that will be the first unit fielded, you get a soldier with more than average interest in the new system and this soldier also starts learning about the system. The 1st Cavalry Division was instrumental in assisting doctrine development for MSE and in identifying recommended improvements to the system, both prior to and during the FOT&E.

**Take care of soldiers.** When the pressure is on to meet a suspense, you can't forget that the test and evaluators and the soldiers unit going through the test need time for themselves and their families.

**Don't proceed to the FOT&E until the system, the unit undergoing the FOT&E and the testing community are all ready.** Identify the decision makers for whether or not the Army should proceed to FOT&E. Get them involved in the fielding and the FOT&E process. Develop realistic criteria for evaluating the level of unit training as well as the capability of the new system. Also, evaluate the testing procedures. Make sure the technical interface between the testers and the system being tested work together. Get the contractor involved. Although the contractor can not participate during the actual FOT&E, this is not true for the initial training and/or evaluation phase when the Army must determine whether or not to go to FOT&E.

In addition to these lessons learned, there are two very good documents that cover MSE lessons learned in a depth and with more specifics than is appropriate for this paper. These two documents are the Headquarters, Communications-Electronics Command memorandum (AMSEL-PL-OP), dated 22 December 1987, Subject: Lessons Learned from the MSE Program [5], and Headquarters US Army Signal Center memorandum (ATZH-DC), dated 19 September 1988, Subject: Mobile Subscriber Equipment (MSE) Lessons Learned. [6]

## ENDNOTES

1. General Louis C. Wagner Jr., "Modernizing the Army's C3I" Signal, January 1989, p. 12.

2. Dr. Jon L. Boyles, "The Mandate for Evolutionary Acquisition," Signal, March 1983, p. 9.

3. HQDA message (SAPA-PP), Subject: Public Affairs Guidance--Army Management Review (AMR)/Defense Guidance Report, dated 101930Z Jan 90.

4. Gayle D. Peterson, "NDI at the Fort Belvoir RDE Center," RD&A Magazine, January-February 1987, p. 14.

5. CECOM Memorandum (AMSEL-PL-OP), Subject: Lessons Learned from the MSE Program, dated 22 December 1987.

6. Signal Center Memorandum (ATZH-DC), Subject: Mobile Subscriber Equipment (MSE) Lessons Learned, dated 19 September 1988.

CHAPTER VII

# RECOMMENDATIONS

The military is facing reduced budgets for the immediate future. Within a reduced funding level, the military must continue to modernize--maintaining the ability to defeat identified "threats". MSE has shown that NDI works, and the Army must make NDI a viable part of its acquisition strategy. NDI can work especially well for command, control, communications and intelligence programs. NDI also reduces the costs of new systems and the time it takes to field them.

The Army gained increased knowledge about how to manage an NDI program from the lessons learned during the MSE program. These lessons learned from MSE, not just the ones in this paper, but also those in the CECOM's and Signal Center's lessons learned reports, should be provided to key Army leadership at HQ DA, the combat development community and the materiel development community. Instructors at the Army's Project Management Course at Fort Belvoir should also be provided copies.

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9. The President's Blue Ribbon Commission on Defense Management: A Quest for Excellence, Final Report to the President, June 1986, p. 47.

10. U.S. Army, 1st Cavalry Division Memorandum (AFVA-GC), Subject: 1st Cavalry Division MSE Distribution and Use, dated 6 May 1988.

11. U.S. Army, CECOM Memorandum (AMSEL-PL-OP), Subject: Lessons Learned from MSE Program, dated 22 December 1987.

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15. U.S. Army, HQDA message (SAPA-PP), Subject: Public Affairs Guidance--Army Management Review (AMR)/Defense Guidance Report, dated 101930Z January 90.

16. U.S. Army, OTEA, Independent Evaluation of MSE by the Operational Test and Evaluation Agency (OTEA), 22 April 1989.

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18. U.S. Army, Signal Center Memorandum (ATZH-CD), Subject: RITA/PTARMIGAN Lessons Learned Visits-Trip Report, dated 19 June 1985.

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