

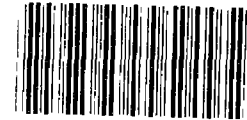
GAO

Briefing Report to the Chairman,
Subcommittee on Defense, Committee on
Appropriations, House of Representatives

July 1987

BATTLEFIELD AUTOMATION

Field Artillery Data Systems Acquisition Problems and Budget Impacts



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National Security and
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July 31, 1987

The Honorable Bill Chappell, Jr.
Chairman, Subcommittee on Defense
Committee on Appropriations
House of Representatives

Dear Mr. Chairman:

As requested in your January 16, 1987, letter and subsequent discussions with your Office, we reviewed issues associated with selected Army fire support command and control (C2) systems. These issues are summarized below and more fully discussed in the appendixes.

In the early 1980s, the Army provided most heavy divisions and one light division an automated artillery fire C2 system called the Tactical Fire Direction System (TACFIRE). Because it was large and heavy, and becoming technically obsolete, the Army stopped buying it and began to develop a new system with improved mobility and capability called Advanced Field Artillery Tactical Data System (AFATDS) for both light and heavy divisions.

Since light divisions did not have TACFIRE and would not have AFATDS until about 1990, the Army planned to procure an improved TACFIRE system for light divisions called Light Field Artillery Tactical Data System (LFATDS).

However, in June 1985, the Army decided to procure LFATDS only for the 9th Division because it did not believe two systems were justified (LFATDS and AFATDS). The Army then decided to field an upgraded version of a fielded data communications system called Fire Support Team/Digital Message Device (FIST/DMD) to provide light divisions an interim fire support C2 capability until AFATDS is fielded. Currently, two early versions of AFATDS are being considered by the Army to provide additional interim capabilities to the light divisions. They are the Concept Evaluation Phase (CEP) AFATDS capability and a follow-on development phase capability.

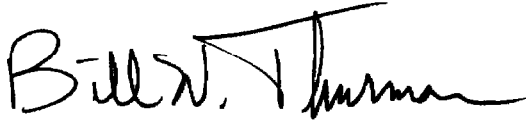
- The AFATDS program is experiencing problems in its CEP that have delayed the program. The contractor and the Army have taken actions which they believe will reduce the risk of further program delays. However, problems already encountered and associated acquisition changes may slip the fielding dates to light and heavy divisions by 3 and 5 years, respectively.
- The LFATDS met its design requirements in the initial operational test and evaluation, and was accepted by the 9th Infantry Division as a "go to war" system.
- The Army's Operational Test and Evaluation Agency (OTEA) concluded that LFATDS does not meet some of the recently identified light divisions' critical requirements. However, LFATDS meets more of these critical requirements than the projected AFATDS CEP version and may meet as many critical requirements as the follow-on AFATDS version expected to be fielded to the light divisions in fiscal year 1992.
- The Army plans to use the FIST/DMD to upgrade the light divisions' fire support C2 capabilities. The system, however, does not meet any of the light divisions' 11 fire support C2 critical effectiveness requirements.
- The Army has not made plans to use the \$25.5 million in fiscal year 1986 funds the Congress earmarked to upgrade light divisions' near-term fire support C2 capabilities.
- The Army is complying with the funding limit on the AFATDS CEP contract as directed by the Congress.
- AFATDS' software problems have delayed its development. Because of these delays the Committee may want to consider reducing the Army's fiscal year 1988 research, development, test and evaluation (RDT&E) and procurement appropriations request by \$29.2 million and \$77.7 million, respectively.

We discussed the issues in this report with Field Artillery Tactical Data Systems program officials and included their comments where appropriate. They concurred that AFATDS development and fielding will be delayed but they have not modified the fiscal year 1988 request for RDT&E or procurement funds because all program plans and acquisition strategies have been put on hold until after the August 1987 program symposium.

B-228648

Unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days from the date of the report. At that time we will send copies to interested parties and make copies available to others upon request.

Sincerely yours,


for Frank C. Conahan
Assistant Comptroller General

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ABBREVIATIONS

AFATDS	Advanced Field Artillery Tactical Data System
C2	command and control
CEP	Concept Evaluation Phase
FIST/DMD	Fire Support Team/Digital Message Device
LFATDS	Light Field Artillery Tactical Data System
OTEA	Operational Test and Evaluation Agency
RDT&E	research, development, test, and evaluation

ARMY FIELD ARTILLERY TACTICAL DATA SYSTEMS

CHART I.1

OBJECTIVES, SCOPE, AND METHODOLOGY

OBJECTIVES

- PROGRAM STATUS:
 - o AFATDS,
 - o LFATDS, AND
 - o FIST/DMD.
- CONGRESSIONAL DIRECTION.
- FISCAL YEAR 1988 FUNDING.

SCOPE AND METHODOLOGY

- REVIEWED DOCUMENTS AND INTERVIEWED OFFICIALS AT:
 - o THE OFFICE OF THE SECRETARY OF DEFENSE;
 - o ARMY HEADQUARTERS;
 - o ARMY FORTS AT ORD, LEWIS, AND MONMOUTH; AND
 - o CONTRACTOR PLANTS.

The objectives of this review were to

- monitor the Army's (1) fire support plans and (2) testing and development of AFATDS, LFATDS, and FIST/DMD;
- determine whether the Army complied with congressional direction relative to the funds appropriated for light division requirements, AFATDS contract cost limit, and the use of fiscal year 1987 appropriated funds; and
- assess fiscal year 1988 funding needs.

To accomplish these objectives, we reviewed documents and interviewed Department of Defense officials from the

- Office of the Secretary of Defense;
- OTEA;
- 7th Infantry Division, Fort Ord, California;
- 9th Infantry Division, Fort Lewis, Washington;
and
- AFATDS program office, Fort Monmouth, New Jersey.

We also observed LFATDS' initial operational test and evaluation at Fort Lewis.

At contractor facilities, we reviewed documents, observed demonstrations, and interviewed the personnel responsible for the systems discussed in this report.

This report does not address the effect of CEP contract modifications on cost, schedule, and system capability. This will be provided later.

Our review was performed in accordance with generally accepted government auditing standards.

AFATDS

CHART II.1

PROBLEMS AND INITIATIVES

AFFECTING SYSTEM DEVELOPMENT

-- DEVELOPMENT PROBLEMS:

- o COMPILER,
- o COMMUNICATION MODEM,
- o SUBCONTRACTOR,
- o LOSS OF ADA PROGRAMMERS,
- o OVER COMMITMENT, AND
- o INADEQUATE MANAGEMENT CONTROLS.

-- INITIATIVES:

- o CONTRACTOR EFFORTS AND
- o PROGRAM MANAGEMENT EVALUATIONS.

The AFATDS prime contractor (Magnavox) has experienced difficulties with software development. The scheduled completion of CEP software development and test has intermittently slipped from September 1986 to February 1988. According to Magnavox, the delays can be attributed primarily to compiler, communication modem, and some system software problems.

In 1984 when it was awarded the AFATDS contract, Magnavox selected the Telesoft Ada compiler because it believed that Telesoft's was the most mature Ada compiler available. However, in June 1986, while inputting software into the target test hardware, the compiler generated errors when translating the software code.

Magnavox believes that the software integration problems with the government furnished communication modems were caused by poorly documented software which was not in machine readable format. In addition, Magnavox's subcontractor experienced problems developing the fire support planning software.

The Army believes that program delays may have been compounded further by the prime contractor's (1) temporary loss of about 20 percent of its programmers, (2) contracting for more than it could produce within cost and schedule constraints, and (3) the lack of management controls to accurately assess program progress. Magnavox and the Army believe that actions taken by them should reduce the risks of further delays.

Magnavox has reported that later versions of the compiler have continued to reduce compiler related problems and that the communication modem integration effort has been completed. Magnavox has also terminated the subcontract for fire support planning software and is now developing this software itself.

To improve program management, the Army has asked Carnegie Mellon Institute to independently review the AFATDS program. The Institute will

- evaluate the Ada compiler status,
- analyze software development and configuration management controls,
- evaluate contractor's software development management procedures, and
- evaluate Army's software management procedures.

CHART II.2

IMPACT OF DEVELOPMENT PROBLEMS

ON AFATDS' FIELDING SCHEDULE

- CEP DELAYED 14 MONTHS;
- CONGRESSIONAL DIRECTION; AND
- FIELDING TO LIGHT AND HEAVY DIVISIONS COULD SLIP 3 YEARS AND 5 YEARS, RESPECTIVELY.

Because of the problems which have delayed the scheduled CEP completion date by 14 months, the Congress directed that the next development phase (maturation of software for light divisions) could not be funded until the CEP is completed and required reviews are favorable. The Army expects to complete the concept evaluation test in May 1988, followed by required evaluations and reviews by OTEA, Army Systems Acquisition Review Council, Defense Acquisition Board and the Congress. Based on prior Army estimates these evaluations and reviews would take at least 7 months. If the reviews are favorable then the Army could award the contract in January 1989. Since the follow-on development phase was planned to be a 3-year concurrent effort starting in January 1986 and ending in January 1989, projected fielding to the light divisions would now be January 1992 using the same 3-year estimate for the follow-on development phase. Contractor officials agreed that January 1992 was a reasonable projected fielding date. If the software required for heavy divisions is also not concurrently developed, this additional 3-year effort would not start until January 1992 with fielding delayed until January 1995 or 5 years later than originally scheduled.

CHART II.3

AFATDS INDEPENDENT EVALUATIONS

- OTEA WILL EVALUATE AFATDS CEP TEST.
- SAME CRITERIA TO BE USED TO EVALUATE OTHER FIRE SUPPORT SYSTEMS.
- CARNEGIE MELLON INSTITUTE TO PERFORM AN INDEPENDENT EVALUATION.

The Army selected OTEA as the independent evaluator of the AFATDS CEP test scheduled to be completed in May 1988. OTEA plans to assess AFATDS CEP software capabilities by applying the same criteria used in the LFATDS' February 1987 evaluation. That criteria is expected to be used to evaluate the FIST/DMD in September 1987. In addition, the Army has contracted with Carnegie Mellon Institute to evaluate the adequacy of CEP testing.

INTERIM AUTOMATED FIRE SUPPORT SYSTEMS

CHART III.1

ISSUES RELATIVE TO LFATDS

- LIGHT DIVISIONS DO NOT HAVE AN AUTOMATED FIRE SUPPORT C2 CAPABILITY.
- LFATDS MET ITS DESIGN STANDARDS IN THE INITIAL OPERATIONAL TEST AND EVALUATION.
- BUT, OTEA CONCLUDED THAT LFATDS IS NOT A LIGHT DIVISION FIRE SUPPORT C2 SOLUTION.
- LFATDS COMPARED TO INTERIM AFATDS SOLUTIONS.

Although the Army believes that light divisions have the highest probability of engaging in a conflict, they do not have an automated fire support C2 capability. The Army originally planned to procure LFATDS to fill this void, but has since decided that LFATDS would be fielded only to the 9th Infantry Division.

LFATDS was accepted as a "go to war" system by the 9th Infantry Division. The initial operational test and evaluation in April 1987 demonstrated that LFATDS met all its design requirements as specified in the light divisions' quick reaction program. However, LFATDS did not meet some of the recently identified critical light division requirements.

OTEA compared the light divisions' critical requirements formulated on March 30, 1987, with the LFATDS' April 1987 test results. OTEA judged LFATDS to have met 5 of 11 critical effectiveness and 1 of 3 critical suitability requirements. As a result, OTEA concluded that LFATDS is neither operationally effective nor suitable as an interim light division system.

We applied OTEA's criteria and methodology to measure the Army's projected (not demonstrated) capabilities of the two interim AFATDS being considered. The Army's projected CEP version of AFATDS would meet 4 of 14 critical requirements. The follow-on light division's version of AFATDS is projected to meet 9 of 14 critical requirements, but actual capabilities may be less. For example, OTEA judged requirements as not met during the LFATDS test when functions were not performed within the required time. The AFATDS software development contract does not specify time limit requirements. Therefore, the CEP and light division's version of AFATDS may also fail to meet the time criteria which will be used by OTEA during testing.

CHART III.2

FIST/DMD STATUS

- FIST/DMD DESIGNED FOR HEAVY DIVISIONS.
- ARMY CONTRACTED FOR 827 FIST/DMDs.
- FIST/DMD'S TO BE ASSIGNED TO LIGHT DIVISIONS.
- SYSTEM DOES NOT MEET ANY LIGHT DIVISION CRITICAL EFFECTIVENESS REQUIREMENTS.

The FIST/DMD was designed for company fire support teams in the heavy divisions, and is expected to provide four channel digital communications for the exchange of target information and fire orders. The Army has contracted for 827 FIST/DMDs. Although not included in the Army's fiscal year 1988 appropriations request, the FIST/DMD program office has asked the Department of the Army for \$9.9 million in fiscal year 1988 for an additional 142 units and \$11.1 million in fiscal year 1989 for 243 more units. This would complete the Army's heavy division authorized acquisition objective of 1,212 units.

The FIST/DMD program was initiated in 1980. The program is over 2-1/2 years behind schedule. The Army awarded a contract in August 1984 and subsequent options to produce 827 FIST/DMDs. Fielding was originally scheduled for July 1985. However, delays which the Army attributes mainly to program restructuring, software problems, and memory capacity have slipped the scheduled first article test completion until August 1987. The FIST/DMD follow-on evaluation is now scheduled for September 1987 with fielding in the second quarter fiscal year 1988.

Although not designed for light divisions, the Army now plans to upgrade the light divisions' fire support C2 capabilities by temporarily giving them FIST/DMDs until AFATDS is fielded. While the FIST/DMD will give light divisions needed digital communications, it will not satisfy any of the light division fire support C2 critical effectiveness requirements.

CONGRESSIONAL DIRECTION

CHART IV.1

COMPLIANCE WITH CONGRESSIONAL DIRECTION

- ARMY HAS NO PLANS TO USE FISCAL YEAR 1986 FUNDS APPROPRIATED TO MEET LIGHT DIVISIONS URGENT NEEDS.
- THE ARMY HAS NOT EXCEEDED CONGRESSIONALLY IMPOSED AFATDS CONTRACT COST LIMIT BUT CONTRACTOR CLAIMS ARE PENDING.
- FISCAL YEAR 1987 FUNDS BEING USED AS DIRECTED.

The fiscal year 1986 Joint Appropriations Conference provided \$25.5 million to meet the light divisions' urgent need for an automated fire support C2 system. As of June 30, 1987, the Army has not made any plans to commit those funds to that end because they plan to wait for the AFATDS to meet those requirements.

The Army has paid the CEP contractor the maximum amount authorized by the Congress. However, in April 1987, Magnavox submitted a \$9 million claim for costs they believe were incurred from a series of events for which the Army was responsible. The claim is being reviewed by the Army and if paid that amount would exceed the funding limit established by the Congress for the CEP contract.

In fiscal year 1987, the Congress appropriated \$10.7 million for AFATDS program office support. As of May 31, 1987, the Army has obligated \$3.7 million and disbursed approximately \$509,000. All of the funds obligated and disbursed as of May 31, 1987, were for program office support.

FISCAL YEAR 1988 FUNDING

CHART V. I

FUNDING SUGGESTIONS

RDT&E

- ARMY REQUESTED FISCAL YEAR 1988 AFATDS FUNDING OF \$40.2 MILLION.
- PROGRAM DELAYS REDUCES FISCAL YEAR 1988 FUNDING NEEDS TO \$11 MILLION.

PROCUREMENT

- ARMY REQUESTED \$77.7 MILLION FOR INITIAL AFATDS PRODUCTION EQUIPMENT.
- SOFTWARE DEVELOPMENT DELAYS OBVIATE THE NEED FOR PROCUREMENT FUNDS.

The Army's fiscal year 1988 RDT&E request of \$40.2 million includes \$11 million for field artillery tactical data system support and \$29.2 million for the AFATDS follow-on software development contract.

As discussed in appendix II, the AFATDS follow-on development phase contract will not be awarded before fiscal year 1989. Therefore, the Committee may want to consider reducing the fiscal year 1988 AFATDS' RDT&E budget from \$40.2 million to \$11 million.

The Army asked for \$77.7 million in fiscal year 1988 to acquire AFATDS fire support C2 equipment. This equipment will be fielded to the 82nd Airborne Division, four light divisions, the 2nd Armored Division, III Corp's Field Artillery and 75th Field Artillery Brigade, and Fort Sill's training base.

The AFATDS procurement request was based on the need for equipment to meet a third quarter fiscal year 1990 fielding date. However, the Army probably will not be able to field AFATDS to light divisions before the second quarter fiscal year 1992. (See app. II.) Therefore, the Committee may want to consider deleting AFATDS fiscal year 1988 procurement funding.

Program officials concurred that AFATDS development and fielding will be delayed but they have not modified the fiscal year 1988 request for RDT&E or procurement funds because all program plans and acquisition strategies have been put on hold until after the August 1987 program symposium.

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