

July 1993

# BATTLEFIELD AUTOMATION

## More Testing and Analysis Needed Before Production of Air Defense Radar



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United States  
General Accounting Office  
Washington, D.C. 20548

National Security and  
International Affairs Division

B-242246

July 30, 1993

The Honorable Les Aspin  
The Secretary of Defense

Dear Mr. Secretary:

This report addresses the Army's strategy for acquiring a ground-based sensor for its forward area air defense system and the testing and analysis needed to support a production decision. We reviewed the sensor, which is expected to cost over \$500 million, because Congress has a continuing interest in its development.

This report contains recommendations to you. The head of a federal agency is required by 31 U.S.C. 720 to submit a written statement on actions taken on these recommendations to the Senate Committee on Governmental Affairs and the House Committee on Government Operations not later than 60 days after the date of the report and to the House and Senate Committees on Appropriations with the agency's first request for appropriations made more than 60 days after the date of the report.

We are sending copies of this report to the Secretary of the Army, interested congressional committees, and other interested parties. Copies will be made available to others on request. Please contact me at (202) 512-4841 if you or your staff have any questions concerning the report. Major contributors to this report are included in appendix II.

Sincerely yours,

Louis J. Rodrigues  
Director, Systems Development  
and Production Issues

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# Executive Summary

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## Purpose

The Army's Forward Area Air Defense System (FAADS) includes a \$540 million sensor to detect and identify enemy aircraft. Because of continuing congressional interest related to cost, schedule, and performance problems with this system and because the Army expects to make a low-rate initial production decision in the near future, GAO's review focused on whether (1) the \$540 million sensor system will be ready for low-rate initial production, planned for fiscal year 1994 and (2) the Army has justified the system as the best alternative for its air defense requirements.

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## Background

The Army is developing a FAADS that will include a command, control, communications and intelligence subsystem to transmit targeting data to air defense weapons. The subsystem will use ground-based sensors (GBS), called FAADS GBS, and other sources to automatically detect and identify aircraft and provide tracking and target information on enemy aircraft. The Army will make a low-rate initial production decision for the FAADS GBS in April 1994 and has requested fiscal year 1994 funding of \$43 million to produce 8 of 117 sensors.

GAO has issued several reports addressing selected aspects of the Army's air defense programs. (See Related GAO Products at the end of this report.)

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## Results in Brief

If a FAADS GBS low-rate initial production decision is made as scheduled, the Army will commit to the acquisition of an unproven system that may not be justified. The Army will not have completed sufficient developmental and operational testing to verify that the FAADS GBS is effective and suitable for its intended use. Also, the Army will not have conducted a cost and operational effectiveness analysis that justifies the sensor as the best cost alternative for meeting air defense requirements before a production decision is made. At the end of GAO's review, the Department of Defense (DOD) delayed production funding for the FAADS GBS until fiscal year 1995. GAO is still concerned that the FAADS GBS receive sufficient testing and a cost and operational effectiveness analysis before any production decision is made.

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## Principal Findings

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### The Army Plans to Buy FAADS GBS Before Adequate Test and Evaluation

The Army plans to make a FAADS GBS low-rate initial production decision without completing all developmental and operational testing to verify that the sensor performs as required. The Army adopted this strategy because it currently does not have an air defense sensor deployed to the forward area and because it considers FAADS GBS a low-risk program. The production decision would have been supported by developmental testing, but the testing would not have included some FAADS GBS critical capabilities, such as operating in the presence of certain countermeasures and avoiding detection by missiles that "home in" on radar signals. Even though operational testing is the services' primary means of predicting whether a system can accomplish its mission, the FAADS GBS will not be operationally tested with its command and control system until after the low-rate initial production decision. While DOD does not require the completion of operational testing prior to low-rate initial production, GAO's past work has shown that beginning production before operational testing has resulted in adverse consequences, such as purchasing equipment that cannot be used as intended and deploying equipment that was operationally unsuitable.

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### The Army Has Not Justified FAADS GBS' Cost Effectiveness

The Army has not justified FAADS GBS's cost and operational effectiveness. DOD regulations require that a cost and operational effectiveness analysis, a study that compares the usefulness and cost of a proposed acquisition with other alternatives, be available for use by decisionmakers during all major decision points in the acquisition program. In 1990, the Army directed that an analysis of FAADS GBS and other FAADS components be prepared to support and justify the acquisition decisions. However, in 1992, the Army suspended the study because (1) the type of air threat changed with the dissolution of the Soviet Union, (2) other key elements of the FAADS program were terminated or suspended, and (3) cuts in the defense budget were anticipated. The Army stated that these changes would invalidate the study's conclusions. The Army recognizes that the original FAADS concept may no longer be realistic in light of threat changes and anticipated defense budget reductions. As a result, it is re-examining the entire FAADS requirements for the post-Cold War era in a study to be completed in August 1993. The Army acknowledges that this study is not a cost and operational effectiveness analysis of the FAADS command and control component or FAADS GBS. DOD, in January 1993, directed the Army

to prepare a cost and operational effectiveness analysis of the FAADS command and control component, including FAADS GBS, by December 1994. In the absence of the required cost-effectiveness analysis, the Army could commit to a sensor system that may not be the best alternative for its air defense needs.

### FAADS GBS Acquisition Plan Is Uncertain

In an effort to cut military spending, DOD deleted fiscal year 1994 funding of \$43 million for low-rate initial production. Consequently, the Army prepared a tentative schedule that eliminated low-rate initial production and provided for operational testing before the full-rate production decision. However, the Army was attempting to have the funds reinstated in order to continue the program as currently planned. At the end of GAO's review, the FAADS GBS funding and schedule remained undecided. DOD commented after GAO completed its review that the Department had decided to delay production funding for the FAADS GBS until fiscal year 1995.

### Recommendations

GAO recommends that the Secretary of Defense direct the Secretary of the Army to defer the FAADS GBS low-rate initial production decision until

- developmental and operational testing provides reasonable assurance that FAADS GBS meets technical performance requirements and that it will perform satisfactorily in an integrated system and
- a cost and operational effectiveness analysis justifies FAADS GBS production as the best alternative to meet the Army's forward area air defense needs.

### Agency Comments

DOD concurred with both recommendations. In formulating the fiscal year 1994 budget request, the Department decided to defer low-rate initial production of the FAADS GBS to allow time for sufficient test and evaluation of the integrated system. In January 1993, the Under Secretary of Defense for Acquisition directed the Army to provide a cost and operational effectiveness analysis of the overall forward area air defense command and control system. This analysis is to include the evaluation of the major sensor alternatives and is expected to be completed by December 1994 to support a full-rate production decision.

DOD's actions to defer low-rate initial production of the FAADS GBS to allow sufficient time for testing is consistent with GAO's recommendation. However, GAO is still concerned that before a low-rate initial production

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decision, the FAADS GBS receive testing in key functions and that the FAADS GBS be tested in a fully integrated FAADS command and control system. GAO will therefore continue to monitor DOD and Army progress on FAADS GBS testing issues.

DOD's action to implement a cost and operational effectiveness analysis for FAADS command and control systems, including the FAADS GBS, is within the spirit of GAO's recommendation, but the timing is wrong. DOD expects to complete a cost and operational effectiveness analysis by December 1994, about 8 months after the low-rate initial production decision in April 1994. It would seem more prudent to delay this production decision until after the cost and operational effectiveness analysis is completed. This way, DOD and the Army can decide if a FAADS GBS is really required before any production decision is made. GAO will continue to monitor DOD and Army actions on these issues.

DOD's comments and GAO's responses are in appendix I.

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## Abbreviations

COEA	cost and operational effectiveness analysis
DOD	Department of Defense
FAADS	Forward Area Air Defense System
FAADS C3I	Forward Area Air Defense System Command, Control, Communications, and Intelligence System
FAADS GBS	Forward Area Air Defense System Ground-Based Sensor
GBS	ground-based sensor





# Introduction

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To protect soldiers and equipment at the front battle lines, the Army needs air defense capabilities to detect and react to attacks by hostile aircraft. The Army plans to provide this capability with a system referred to as the Forward Area Air Defense System (FAADS). As a part of FAADS, the Army plans to acquire an air defense radar to detect and track fixed-wing and rotary-wing aircraft over the forward area. It also plans to acquire 117 off-the-shelf radars, called FAADS ground-based sensors (FAADS GBS), and associated equipment. Total acquisition costs are estimated at about \$540 million, with each sensor costing over \$4.6 million. The Army had scheduled production to begin in 1994 and later revised it to 1995.

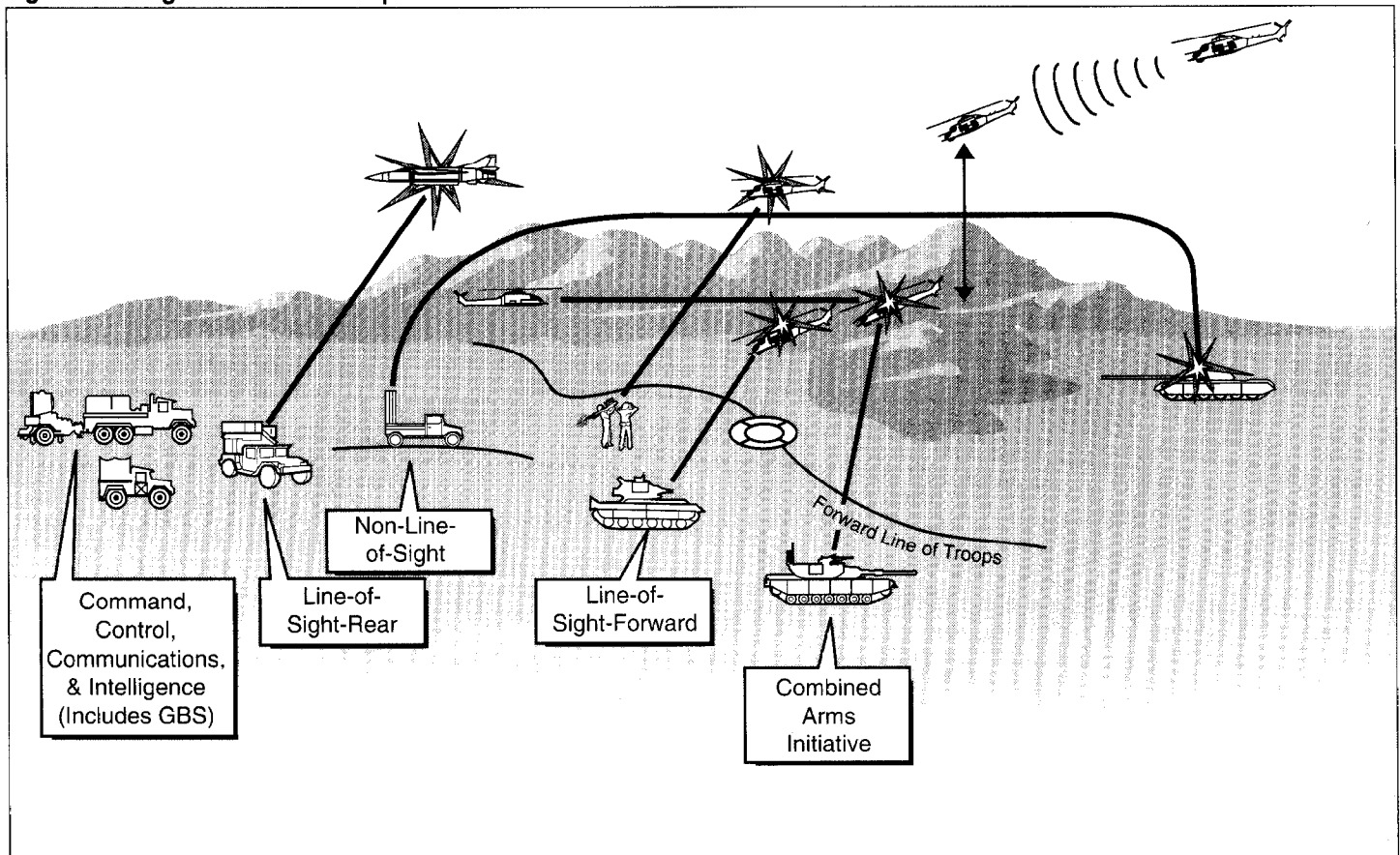
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## FAADS GBS Planned as Part of an Integrated System

FAADS includes three air defense weapons and a command, control, communications, and intelligence system (FAADS C3I) to automate command and control of air defense weapons. FAADS C3I, which includes FAADS GBS integrated with computers, software, and other devices, is to automatically detect and identify incoming low-flying enemy aircraft. The system is to provide targeting and tracking information to forward area air defense units. This information will enable the units to pivot their weapons more quickly toward enemy aircraft.

The Army planned to use the FAADS GBS to provide information to three air defense weapon systems—line-of-sight-forward, line-of-sight-rear, and non-line-of-sight. Also, the Army had a Combined Arms Initiative to enhance air defense fire power. Figure 1.1 shows the original FAADS concept.

Figure 1.1: Original FAADS Concept



Source: U.S. Army

To date, however, the Army has produced only one of the planned air defense weapons, the line-of-sight-rear, called the Avenger system. Both of the Army's systems for the line-of-sight-forward and the non-line-of-sight weapons were canceled because of cost concerns and problems encountered during development. Instead of the line-of-sight-forward weapon system, the Army is fielding teams of soldiers carrying portable Stinger missiles aboard the Bradley Fighting Vehicle. The Army has not fielded a replacement for the non-line-of-sight weapon system. FAADS GBS' function will be to provide data to the Avenger and other units.

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In 1990, the Army retired an existing forward area radar, citing high operating and support costs and performance limitations. As an interim measure, the Army has contracted for a lightweight radar for its more mobile light and special divisions. Fielding of the interim radar is expected to begin during 1993. Until then, light and special divisions, as well as heavy divisions, will rely on soldiers equipped with binoculars and radios to detect aircraft in the forward battle area. FAADS GBS will replace the binoculars and the interim radar.

FAADS GBS acquisition has encountered delays. In 1986, when the Department of Defense (DOD) approved development of FAADS C3I, including FAADS GBS, the system was scheduled to be fielded in 1990. The Army requested proposals for an off-the-shelf sensor in 1988, but only one system was offered for testing. The Army tested the sensor, found it did not meet requirements, and terminated the solicitation in 1989. The Army then reduced the performance requirements for FAADS GBS and resolicited proposals. It decided to use a "best value" acquisition strategy that would enable it to purchase the sensor that came the closest to meeting requirements, with modifications to be done later, as needed.

The Army tested the seven proposals received in response to the second solicitation and, in 1992, awarded the FAADS GBS contract to Hughes Aircraft Company for its TPQ-36A sensor as the best value sensor. The Army has authorized acquisition of 117 sensors for fielding to FAADS units. The FAAD Sensors Product Office estimates production costs to be about \$390 million for the 117 FAADS sensors. Total acquisition costs are estimated at \$540 million. The first fielding of production sensors to an air defense unit is scheduled in 1996.

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## Objectives, Scope, and Methodology

Our objectives were to determine whether (1) testing of FAADS GBS warranted entering production and (2) the system is adequately justified. To assess the adequacy of testing to support a FAADS GBS production decision, we reviewed FAADS GBS program schedules, test plans and results, requirements documents, acquisition plans, and other DOD sensor development and acquisition programs. We discussed these documents and plans with program officials.

In addition, we reviewed cost and operational effectiveness analyses (COEA) and related information and held discussions with the user representative to determine whether the Army justified its requirement for FAADS GBS. We also discussed the effect of the numerous changes taking

place, such as threat changes and budget cutbacks, on the FAADS GBS program.

Because FAADS GBS is to be integrated with other air defense systems, we also monitored the progress and problems of other FAADS programs such as line-of-sight-forward, non-line-of-sight, and the communication software system that is to be used with FAADS GBS. We assessed the impact of the other air defense systems' problems to further address FAADS GBS' readiness for production. We also discussed each of the FAADS GBS program issues with DOD and Army headquarters officials.

During the review, we obtained information and held discussions with officials in the following organizations:

- FAAD Sensors Product Office, Huntsville, Alabama;
- Air Defense Command and Control Systems Project Office, Huntsville, Alabama;
- Program Executive Officer, Intelligence and Electronic Warfare, Army Communications and Electronics Command, Fort Monmouth, New Jersey;
- U.S. Army Air Defense Artillery School, Fort Bliss, Texas;
- U.S. Army Combined Arms Command and U.S. Army Training and Doctrine Command Analysis Command, Fort Leavenworth, Kansas;
- Headquarters, Department of Defense, Arlington, Virginia; and
- Headquarters, Department of Army, Arlington, Virginia.

We performed our review from June 1992 through May 1993 in accordance with generally accepted government auditing standards.

We obtained written agency comments on this report. DOD's comments and our responses are in appendix I.

# The Army Plans to Buy FAADS GBS Before Adequate Testing and Analysis

The Army plans to commit to low-rate initial production of the FAADS GBS in fiscal year 1994 without completing testing to verify system performance or analysis to determine that FAADS GBS is the best cost alternative to meet air defense needs. Army officials are willing to commit to production because they have no air defense sensor and want to field one as quickly as possible. Also, they consider FAADS GBS to be a low-risk program. If a FAADS GBS production decision is made before testing and analysis, the Army will be committing to the acquisition of an unproven sensor that may not be justified. In response to the need to further reduce defense spending, DOD has now eliminated the fiscal year 1994 low-rate initial production funding for FAADS GBS, but an April 1994 low-rate initial production decision will still be made. Also, DOD has directed that a COEA be completed on the FAADS command and control component by December 1994. However, this is 8 months after the low-rate initial production decision on FAADS GBS, according to revised plans. We are still concerned that the FAADS GBS receive sufficient testing and analysis before any production decision is made.

## The Army Plans to Acquire System Before Developmental and Operational Tests Are Complete

The Army plans to make a low-rate initial production decision on FAADS GBS in April 1994, before completing all developmental and operational testing. DOD regulations emphasize that test and evaluation is an aid to decision-making that should be considered at key acquisition decision points. Although DOD regulations do not specifically require all testing to be completed prior to a low-rate initial production decision, our past work has shown that beginning production before completing testing has resulted in adverse consequences.

## Thorough Testing Predicts System Performance

DOD Instruction 5000.2, part 8, requires that test and evaluation be performed to verify that systems have attained technical performance specifications and are operationally effective and suitable for the intended use. DOD requires both developmental and operational testing to provide essential information to support decision-making. Developmental testing verifies that the system meets technical performance specifications and that it is ready for operational testing. Operational testing, conducted under realistic combat conditions, verifies that the system is operationally effective and suitable for the mission intended, and is the Army's primary method of predicting system performance.

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**Developmental Testing Will  
Not Address Key  
Performance Areas**

The Army's developmental testing will not address key performance areas, such as tracking multiple targets and capabilities against future threat countermeasures, before the Army plans to make the low-rate initial FAADS GBS production decision. The Army's developmental test plans for FAADS GBS are in two phases. The Army will conduct phase I developmental testing from August through September 1993 and phase II from May through September 1994. Since the Army plans to make a low-rate initial production decision in April 1994, phase II testing results will not be available until after the production decision. In addition, Army officials have stated that time and funding constraints may cause parts of FAADS GBS phase I developmental testing to be postponed.

Although Army officials maintain that partial completion of developmental testing provides adequate support for a low-rate initial production decision, some key performance areas may not be tested before the decision. The Army will not know if FAADS GBS can

- simultaneously track the required number of targets, which would indicate whether FAADS GBS can help protect ground troops against large numbers of attacking aircraft;
- perform well against threat countermeasures that can degrade performance, such as (1) chaff, which is dispensed by enemy aircraft to evade detection and (2) electronic countermeasures, which are radiated by enemy aircraft to confuse radar signals;
- evade detection by antiradiation missiles, which can destroy FAADS GBS by detecting and homing in on its radar signals; and
- operate for the required hours without needing maintenance and repair.

Thus, the Army may commit to the production of FAADS GBS without the assurance that the sensors meet technical performance specifications.

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**Production Decision Will  
Precede Critical  
Integration Testing**

The Army does not plan to operationally test the FAADS GBS with the FAADS C3I system until after the low-rate initial production decision. However, interoperability with FAADS C3I is crucial, because FAADS GBS operating alone cannot provide the air defense weapons with the most accurate and timely targeting information. The first integration testing of FAADS GBS with FAADS C3I is planned for May 1994, a month after the FAADS GBS low-rate initial production decision.

Further, thorough operational testing of FAADS GBS with FAADS C3I will not be conducted until October 1994. This is to be a realistic test in which

major components of an air defense battalion defend division assets in a combat environment, using production-type hardware, software, and communications equipment to pass FAADS GBS information to air defense weapons. The operational test will be the “final examination” that informs Army decisionmakers whether the FAADS GBS and the other FAADS C3I systems are effective and suitable for the forward area air defense mission.

Even though DOD regulations do not specifically require operational testing prior to low-rate initial production, our past work has shown that beginning production before completing operational testing can result in adverse consequences. For example, we reported that beginning production before operational testing resulted in the purchase of electronic warfare equipment that could not be used for its intended purpose.<sup>1</sup> We also reported that other electronic warfare systems were deployed to combat forces despite having been judged operationally unsuitable. In another example, we reported in a 1993 classified report that the entire quantity of an electronic warfare system was acquired through a series of low-rate production options without passing operational testing. As a result, the system is undergoing costly repair and replacement.

DOD commented after we completed our analysis of the FAADS GBS, that it decided to delay funding for low-rate initial production of the FAADS GBS for 1 year. DOD said that this would allow time to complete initial operational testing of the integrated system. We are encouraged by DOD’s action. However, we are still concerned that the testing should include key performance areas and operational testing with FAADS C3I before any production decision is made. We will continue to evaluate DOD’s and the Army’s actions regarding the testing plan and schedule.

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## The Army Has Not Justified System’s Cost and Operational Effectiveness

The Army does not have a COEA to support the acquisition of FAADS GBS, although one is required at acquisition milestones. In April 1990, the Army began an FAADS C3I COEA that included FAADS GBS, but suspended it in March 1992 because of uncertainties and changes regarding enemy threat, future budget resources, and terminated or unfunded related FAADS acquisition programs. The Army believed the changes would have invalidated the study’s findings and conclusions. Instead, it began a Division Air Defense Study, to be completed in August 1993, to reassess the entire air defense needs for the forward area. The Under Secretary of

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<sup>1</sup>Electronic Warfare: Navy/Air Force Still Developing Separate, Costly Radar Warning Receivers (GAO/NSIAD 87-167, July 1, 1987).



Defense for Acquisition, in January 1993, requested that the Army complete an FAADS C3I COEA by December 1994.

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**COEA Required to Support Key Acquisition Milestones**

DOD Instruction 5000.2 requires that COEAs be prepared and considered at acquisition milestones. A COEA evaluates the costs and benefits of alternative courses of action to meet recognized defense needs. COEAs are intended to accomplish three objectives: (1) aid decision-making by illuminating the relative advantages and disadvantages of the alternatives being considered and by showing the sensitivity of each alternative to possible changes in key assumptions (e.g., the threat) or variables (e.g., selected performance capabilities); (2) facilitate communications by early identification and discussion of reasonable alternatives among decisionmakers and staffs at all levels; and (3) document acquisition decisions by providing the analytical underpinning or rationale for decisions on a program. DOD requires a new COEA when conditions have changed sufficiently so that previous COEA determinations are no longer valid.

**Comprehensive COEA Directed for FAADS C3I**

In April 1990, the Army directed its Training and Doctrine Command to conduct an FAADS C3I COEA to support input into the acquisition process. The study was to address each of the FAADS C3I components, including the FAADS GBS, in sufficient detail to provide the rationale needed to justify them during program and budget reviews.

FAADS analyses have been conducted in the past, but none isolated the individual costs and contributions of FAADS GBS. The Army acknowledged that without the 1990 study, fielding individual FAADS C3I components separately is not adequately justified.

**FAADS C3I Study Suspended Due to Threat, Resource, and FAADS Materiel Uncertainties**

The Army began the FAADS C3I analysis in April 1990, but in March 1992 suspended it because of changes and uncertainties regarding enemy air threat, future budget resources, and terminated and unfunded related FAADS materiel programs. The Army stated the changes would have invalidated the study's findings and conclusions. The Under Secretary of Defense for Acquisition, in January 1993, directed the Army to provide an FAADS C3I COEA by December 1994.

FAADS C3I, including FAADS GBS, was devised to counter the Soviet threat as the principal threat to U.S. interests and objectives. However, with the

collapse of Eastern European communism, the demise of the Warsaw Pact, and ongoing changes within the former Soviet Union, the U.S. security agenda is being rewritten. Current threat assessments emphasize possible smaller threats in other regions of the world.

Decreasing defense budgets reflect the changes in threat and current economic conditions. DOD has begun reducing the defense budget and plans to reduce it further in the coming years. The services have begun downsizing to meet the budget reductions. For example, compared to 1990 force levels, by the end of fiscal year 1995, the Army will have six fewer divisions.

The pressure on the defense budget also casts uncertainties on the future of FAADS GBS related programs. Army materiel plans supporting the different components of FAADS have either not been funded or have been changed because of the following cost and performance considerations:

- In 1990, the non-line-of-sight weapon system's funding was deleted because of cost considerations. This funding has been restored and the system redesignated as the non-line-of-sight combined arms.
- In 1992, the primary forward area air defense weapon system, line-of-sight-forward, was terminated due to cost and maintainability problems. The Army has selected the Bradley Stinger Fighting Vehicle as an interim replacement materiel plan for the line-of-sight-forward system.
- An advanced identification friend or foe system, Mark XV, was canceled because of cost concerns.

Because the Army suspended the 1990 study, the original analysis was not fully completed. For example, the study did not consider all alternatives such as the interim lightweight radar the Army is acquiring for light and special divisions. Also, the study did not address the cost effectiveness of FAADS GBS. The Director, Directorate of Combat Developments, U.S. Army Air Defense Artillery School, Fort Bliss, Texas, concluded that the study was suspended before substantial analysis was available to fully support findings. The Director added that future combat development decisions should not be made based on this analysis.

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## **Entire FAADS Concept Under Study**

The U.S. Army Air Defense Artillery School is re-examining the entire FAADS concept and plans to recommend what is needed to counter the air threat and protect the soldier in the forward area. However, this study is not a substitute for a COEA for FAADS, FAADS C3I, or FAADS GBS.

The effort, referred to as the Division Air Defense Study, is scheduled to be completed in August 1993. It will assess the potential air threat to the division and the current air defense concept and capabilities. If the current FAADS concept is found to be no longer valid, the study will develop a revised concept and recommend appropriate solutions for implementation. Shortfalls in air defense capabilities may be corrected by changes in doctrine, organization, training, and/or materiel plans. The results are to include estimates of what solutions can be achieved at various ranges in cost. The Army would like to have the final results available in time to support its fiscal year 1996-2001 acquisition planning effort. A Directorate of Combat Developments, U.S. Army Air Defense Artillery School representative stated that a COEA for FAADS GBS is not feasible until the Division Air Defense Study is completed and future air defense needs are defined.

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### **The Army Wants to Begin Acquiring and Fielding System Because It Has No Air Defense Radar**

The Army plans to begin low-rate initial production without completing testing and conducting a COEA because of a perceived gap in forward area radar coverage for heavy divisions. The Forward Area Alerting Radar was retired in 1990 because the Army decided that it was too costly to operate and maintain. The Army realized that the retirement created a gap in air defense capability and, as an interim measure, began procuring a lighter, less capable, and less costly air defense radar for light and special division units. The Army decided to accept the air defense risk in heavy divisions until an FAADS GBS is available. Further, it decided to accept the risk of an FAADS GBS acquisition schedule with concurrent test, development, and acquisition to field an FAADS GBS radar as quickly as possible. The Army and DOD consider FAADS GBS to be a low-risk program.

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### **FAADS GBS Acquisition Plan Is Still Uncertain**

During our review, program officials told us that fiscal year 1994 funding of \$43 million for low-rate initial production was deleted by DOD in an effort to cut military spending. Consequently, they prepared a tentative schedule that eliminated low-rate initial production and provided for operational testing before the full-rate production decision. Program officials told us that this funding cut would have had serious consequences for the program and that the Army was attempting to have the funds reinstated in order to continue the program as currently planned. DOD commented, after we had completed our audit work, that it decided to delay funding for low-rate initial production of the FAADS GBS until fiscal year 1995. DOD said that this would allow time to complete initial

operational testing of the integrated system. We will continue to monitor testing issues to ensure that appropriate procedures are followed.

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## **Conclusions and Recommendations**

The Army plans to make a production decision on the \$540 million FAADS GBS without (1) waiting for the results of all developmental testing; (2) having integrated and operationally tested the FAADS GBS with the command, control, and communications system it is being acquired to support; and (3) completing a COEA that would support FAADS GBS as the best alternative to meet air defense needs. A more prudent approach would be to complete testing and decide if the FAADS GBS is really needed before a decision is made to acquire it.

Given the uncertainties that still surround the FAADS GBS acquisition, there is the potential for the Army to commit to an unproven system that may not be justified. Therefore, we recommend that the Secretary of Defense direct the Secretary of the Army to defer the FAADS GBS low-rate initial production decision until

- developmental and operational testing provides reasonable assurance that FAADS GBS meets technical performance requirements and will perform satisfactorily in an integrated system and
- a COEA justifies FAADS GBS's production as the best alternative to meet the Army's forward area air defense needs.



# Comments From the Department of Defense

Note: GAO comments supplementing those in the report text appear at the end of this appendix.



COMMAND, CONTROL,  
COMMUNICATIONS  
AND  
INTELLIGENCE

ASSISTANT SECRETARY OF DEFENSE

WASHINGTON, D.C. 20301-3040

May 20, 1993

Mr. Frank C. Conahan  
Assistant Comptroller General  
National Security and International  
Affairs Division  
U.S. General Accounting Office  
Washington, D.C. 20548

Dear Mr. Conahan:

This is the Department of Defense (DoD) response to General Accounting Office (GAO) draft report, "(U) BATTLEFIELD AUTOMATION: More Testing and Analysis Needed Before Production of Air Defense Radar," dated April 20, 1993 (GAO Code 395191/OSD Case 9375). The Department generally concurs with the report.

In the draft report, the GAO described three principal concerns: (1) the degree of testing planned for the forward area air defense system ground-based sensor prior to the initial production decision; (2) the uncertainty regarding the acquisition plan; and (3) the lack of a cost and operational effectiveness analysis. Since the GAO completed its audit work, the Department addressed all of these issues. In preparing the DoD budget for FY 1994, the Department decided to delay funding for initial production of the ground-based sensor by one year, to allow time to complete initial operational testing of the integrated system. Uncertainty in the acquisition plan was removed with the submission to Congress of the FY 1994 budget request. In addition, the Army has been tasked to prepare a cost and operational effectiveness analysis of the overall forward area air defense command and control system. The analysis should be completed by December 1994.

The DoD offers several additional clarifications. On page 10 of the draft report, the GAO indicated that "program officials have not completed an estimate of the costs needed to modify and improve the sensor." There are no plans to improve the radar, which is expected to meet the need. The only projected modification is to mount the radar on a different vehicle, in order to achieve mobility goals. Funds for this conversion are included in the program costs reported by the GAO.

Concerning the risks associated with acquisition of the ground-based sensor, the experience that has been gained with the radar (the TPQ-36A) should also be considered. In addition

See comment 1.

See comment 2.

See comment 3.

See comment 4.

Appendix I  
Comments From the Department of Defense

See comment 4.

to more than ten years of U.S. Army operation of the TPQ-36 (which has 80 percent commonality with the ground-based sensor), Norway has owned and operated 24 TPQ-36A radars since 1987. Additionally, the TPQ-36A has already undergone two significant DoD tests, including electronic countermeasures, as part of the source-selection process. The omission of this experience from the report prevents an informed assessment of the risk of the program, which the Department considers to be low.

With the recent changes in the planned acquisition approach for the ground-based sensor, the DoD is confident that successful development and fielding will be accomplished as planned. The Department will insure that the program continues to comply with appropriate acquisition policies and guidelines.

The detailed DoD comments on the draft report recommendations are provided in the enclosure. The DoD appreciates the opportunity to comment on the draft report.

Sincerely,



Charles A. Hawkins, Jr.  
Acting

Enclosure

GAO DRAFT REPORT - DATED APRIL 20, 1993  
(GAO CODE 395191) OSD CASE 9375

"BATTLEFIELD AUTOMATION: MORE TESTING AND ANALYSIS  
NEEDED BEFORE PRODUCTION OF AIR DEFENSE RADAR"

DEPARTMENT OF DEFENSE COMMENTS

\* \* \* \* \*

RECOMMENDATIONS

- **RECOMMENDATION 1:** The GAO recommended that the Secretary of Defense direct the Secretary of the Army to defer production of the Forward Area Air Defense System ground-based sensors until developmental and operational testing provides reasonable assurance that the ground-based sensors meet technical performance requirements and will perform satisfactorily in an integrated system. (pp. 4-5, p. 20/ GAO Draft Report)

Now on pp. 4 and 18.

See comment 1.

**DOD RESPONSE:** Concur. In the course of formulating the DoD budget request for FY 1994, the Department has decided to defer initial production of the ground-based sensor until FY 1995, to allow time for sufficient test and evaluation of the integrated system.

- **RECOMMENDATION 2:** The GAO also recommended that the Secretary of Defense direct the Secretary of the Army to defer production of the Forward Area Air Defense System ground-based sensors until a cost and operational effectiveness analysis justifies the ground-based sensors production as the best alternative to meet the Army forward area air defense needs. (p. 5, p. 20/GAO Draft Report)

Now on pp. 4 and 18.

See comment 2.

**DOD RESPONSE:** Concur. In January 1993, the Under Secretary of Defense for Acquisition directed the Army to provide a cost and operational effectiveness analysis of the overall forward area air defense command and control system. The analysis will include the evaluation of the major sensor alternatives and is expected to be completed by December 1994, to support a Milestone III production decision.

Enclosure



The following are GAO's comments on the Department of Defense's letter dated May 20, 1993.

## GAO Comments

1. DOD's actions to defer low-rate initial production of the FAADS GBS to allow sufficient time for testing is consistent with our recommendation. However, we are still concerned that the FAADS GBS receive testing in key functions and that the FAADS GBS be operationally tested with FAADS C3I before the Army makes a planned April 1994 low-rate initial production decision. We will therefore continue to monitor DOD and Army progress on FAADS GBS testing issues.
2. DOD's action to implement a COEA for FAADS C3I, including the FAADS GBS, is within the spirit of our recommendation but the timing is wrong. DOD expects to complete a COEA by December 1994, about 8 months after the low-rate initial production decision in April 1994. It would seem more prudent to delay the low-rate initial production decision until after the COEA is completed. This way DOD and the Army can decide if an FAADS GBS is really required before a low-rate initial production decision is made. We will continue to monitor DOD and Army actions on these issues.
3. The text of the final report was changed to reflect DOD's comment.
4. We have changed the text to reflect that DOD considers the FAADS GBS acquisition a low-risk program. Perhaps this is true when the FAADS GBS is considered by itself. However, the FAADS GBS is part of the FAADS C3I system that has been under development for over 10 years and has consumed over \$556 million with nothing in the field yet. We believe there is a significant risk in deciding to produce the FAADS GBS before DOD and the Army know if it will work with FAADS C3I and before a COEA is completed, which may point to a much less complicated and less costly radar as the solution to anticipated air threats.

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Battlefield Automation: Army Needs to Reevaluate Air Defense Radar Acquisition Programs (GAO/NSIAD-91-91, May 3, 1991).

Major Acquisition Programs: Selected Aspects of the Army's Forward Area Air Defense System (GAO/NSIAD-90-191, June 25, 1990).

Battlefield Automation: Army's Air Defense Command and Control System Status and Program Issues (GAO/NSIAD-90-12BR, Dec. 20, 1989).

DOD Acquisition Programs: Status of Selected Systems (GAO/NSIAD-88-160, June 30, 1988).

Battlefield Automation: Army Air Defense Command and Control System Acquisition and Budget Issues (GAO/NSIAD-87-208, Sept. 28, 1987).

DOD Acquisition Programs: Status of Selected Systems (GAO/NSIAD-87-128, Apr. 2, 1987).

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