



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

National Security and  
International Affairs Division

B-274674

September 20, 1996

The Honorable William J. Perry  
The Secretary of Defense

Dear Mr. Secretary:

As a part of our review of the Department of Defense's (DOD) fiscal year 1997 budget request, we examined the military services' Joint STARS<sup>1</sup> efforts. We understand that DOD has recently reached a decision to commit to the full-rate production of Joint STARS. We have serious questions whether the performance of the system to date warrants this commitment. We are concerned that this system has not demonstrated a maturity justifying a full-rate production decision.

Specifically, we have reviewed the Air Force Operation Test and Evaluation Center's (AFOTEC) multiservice operational test and evaluation (MOT&E) final report, dated June 14, 1996, and do not believe a decision should be made to proceed with full-rate production until DOD has adequately addressed issues raised by that report. These are that the Joint STARS system (1) has not demonstrated its operational effectiveness and suitability; (2) may not have been tested in a realistic, unbiased manner; and (3) suffers from a serious lack of software maturity that significantly impedes the system's reliability and effectiveness. We are not aware that these issues have been adequately addressed. If they are not adequately addressed before a formal commitment to full-rate production, the likely consequence will be unacceptable program delays, unnecessary cost growth, and less than satisfactory performance of the system.

To assist us in carrying out our continuing oversight of DOD weapons programs, we therefore formally request that DOD provide us, by October 8, 1996, its analysis of how it has addressed the issues raised in the June 14, 1996, MOT&E final report, and how it believes they have been sufficiently mitigated to justify a decision to go into full rate production.

---

<sup>1</sup>The Army and the Air Force are jointly developing the Joint Surveillance Target Attack Radar System (Joint STARS). The Army is responsible for the ground station modules and the Air Force is responsible for the airframe, the E8-C.

**Joint STARS OPERATIONAL  
EFFECTIVENESS AND SUITABILITY  
NOT DEMONSTRATED**

AFOTEC's report raised serious issues regarding whether the Joint STARS demonstrated its operational effectiveness and suitability during its Combined Developmental and Operational Testing and during its Operational Evaluation, done during its involvement in Operation Joint Endeavor (U.S. action in Bosnia). Specifically, the report states that the "Joint STARS software is immature and significantly impedes the system's reliability and effectiveness." We do not believe that this statement supports a conclusion that this system could be judged as operationally effective. We also note that of two critical suitability measures of performance (MOP), one could not be judged and the other was rated as not meeting the user's criteria. Furthermore, of 25 suitability support MOPs, 8 were not evaluated against pass/fail criteria, 5 were ruled as meeting the user's criteria, 8 were ruled as not meeting the user's criteria, and 4 were not tested.

Given that the two critical MOPs were not demonstrated and that 12 suitability MOPs were not met or tested, it is not apparent to us that operational suitability has been demonstrated. If the DOD decision to enter full-rate production of the system was based on some assumption of a level of risk, what plans did DOD and the services develop prior to reaching a decision to mitigate program risks related to the issues raised in the AFOTEC report?

**OPERATIONAL ENVIRONMENT AND  
CONTRACTOR INVOLVEMENT MAY  
INVALIDATE RESULTS**

We understand that because of anticipated involvement of Joint STARS in Operation Joint Endeavor the planned formal MOT&E of the Joint STARS system was modified. We also understand that during Operation Joint Endeavor the system's operation placed limitations on the Operational Evaluation that was performed and that the services' priority was appropriately to support the field commander as much as possible. Our evaluation has indicated that such constraints resulted in too many MOPs not being tested and changes in procedures and contractor involvement that raise serious questions about the validity of comparing other Operational Evaluation reported results to the criteria set for the Joint STAR's MOT&E.

The method of using the Joint STARS Ground Station Module is an example of procedural changes that raise serious questions about using Operational Evaluation reports to judge system operational effectiveness and suitability. The operational availability MOP called for the ground station modules (GSM) to provide operational availability at least 75 percent of the time GSMs were in mission-ready status.

MOT&E provided a methodology by which each tested GSM was to perform on its own. However, the AFOTEC report indicated that the Army's method of using GSM during Operational Evaluation clearly raised the chances for operational availability testing success. For example, the report states that the ". . . two GSM maintained . . . connectivity with the E-8C [aircraft], one as Master and the other as Slave. In cases where the Master GSM experienced an essential function failure, operations were transferred to the Slave GSM. GSM operational availability was affected only when both GSMs were nonoperational concurrently, system downtime was only counted once."

We also note that the AFOTEC report states in its conclusions on the GSM operational availability results that

". . . the assumptions for GSM operations used to formulate the user requirement were not present during the deployment. The GSM did not run 24-hour operations, nor was the [Operation Mode Summary/Mission Profile] followed. The administrative and logistics delay time was not computed because of the extraordinary measures taken to ensure parts availability and resupply. Direct support and depot maintenance was performed by the contractor. These conditions were dictated by mission needs. The availability results are consistent with a contractor demonstration and have limited operational flavor (as defined by the user)."

The GSM operational MOP was one of the two MOPs used to determine whether the system as a whole (E8-C and GSM) had demonstrated the availability criteria.

The degree of contractor involvement during Operational Evaluation also raises serious questions about the validity of comparing Operational Evaluation results to MOT&E criteria. The MOT&E test plan noted the importance of limiting contractor involvement during the testing, stating "SYSTEM CONTRACTOR INVOLVEMENT. MOT&E must yield the most credible and objective results possible. All facets of the test effort must operate under the rules that support total objectivity and prevents improper data manipulation." The test plan also states that interim contractor support "will be limited to perform ground maintenance only; no in-flight support." Regarding the Army's GSM, the AFOTEC report noted that "the Army maintenance concept does not call for [contractor involvement] at any level . . ."

However, during Operational Evaluation there was significant contractor involvement in support of the two aircraft and 12 GSMs deployed. The AFOTEC report states "Approximately 80 contractors were deployed to support the E-8C. However, three or four systems engineers flew on each flight to ensure they could provide system stability and troubleshooting expertise during missions. Additionally three or four software engineers were on the ground full time, researching and developing software fixes to software problems identified during the deployment."

The report also stated that "Each of the 12 GSMS had one contractor representative on site and on call with additional help available as necessary. Five contractor representatives remained at [Rhein-Main Air Base] and functioned as a depot."

The AFOTEC report states that the "contractor was deeply involved in isolating and repairing anomalies during the [Operational Evaluation]," and later the report states that the "test director agreed to contractor participation in the [Operational Evaluation] to a greater extent [than] permitted under US Public Law, Title 10, Section 2399."

This agreement arose for three reasons that account for the level of contractor involvement during the Operational Evaluation and in support of Operation Joint Endeavor. Two of the three are of interest because they occurred after the planned MOT&E shifted to Operation Joint Endeavor. The report states ". . . when the MOT&E shifted to Operation Joint Endeavor on a non-interference basis, the contractor's involvement expanded considerably. The contractor's program manager approached the test director and stated contract stipulations required four [contractor] technicians to fly because the aircraft was still under contractor management and control. . . . after analyzing 3 weeks of system performance data, the [Joint STARS Squadron (Provisional)] commander determined further adjustments to contractor involvement were necessary to better support [Operation Joint Endeavor] objectives."

As we consider all of these data taken together, we conclude that there is sufficient cause to question the validity of using the Operational Evaluation results in judging whether the Joint STARS system demonstrated operational effectiveness and suitability. Does DOD believe that the level of contractor involvement complied with legal requirements and had no effect on the ability to judge Joint STARS system performance demonstrated during the operational evaluation?

**LACK OF SOFTWARE MATURITY IS  
OF GREAT CONCERN**

Of the six software MOPs, five did not meet test criteria and one was not tested. The AFOTEC report stated that "during Joint STARS MOT&E, software deficiencies were noted on every E-8C subsystem." Furthermore, in discussing the software's usability MOP, the report said that the software "does not adequately support operator in executing the mission" and in discussing the software's maturity it stated that "Joint STARS software does not show the expected maturity trends of a system at the end of development." The above discussion on the software performance indicates that neither operational effectiveness nor suitability have been demonstrated. Further, the type of system maturity that should be demonstrated prior to moving to full-rate production at this time is not apparent. Is there additional information that could support a more positive conclusion?

-----

As we previously mentioned, we are concerned about DOD's decision to move forward with full-rate production of the system and we are providing copies of this letter to the congressional committees of jurisdiction and other interested congressional and DOD parties. Your response to our inquiry will also be provided the same congressional distribution. If you or your designee have any questions please contact me or Bruce H. Thomas at (202) 512-4841.

Sincerely yours,



Thomas J. Schulz  
Associate Director,  
Defense Acquisitions Issues



---

---

### Ordering Information

The first copy of each GAO report and testimony is free. Additional copies are \$2 each. Orders should be sent to the following address, accompanied by a check or money order made out to the Superintendent of Documents, when necessary. VISA and MasterCard credit cards are accepted, also. Orders for 100 or more copies to be mailed to a single address are discounted 25 percent.

**Orders by mail:**

**U.S. General Accounting Office  
P.O. Box 6015  
Gaithersburg, MD 20884-6015**

**or visit:**

**Room 1100  
700 4th St. NW (corner of 4th and G Sts. NW)  
U.S. General Accounting Office  
Washington, DC**

**Orders may also be placed by calling (202) 512-6000  
or by using fax number (301) 258-4066, or TDD (301) 413-0006.**

**Each day, GAO issues a list of newly available reports and testimony. To receive facsimile copies of the daily list or any list from the past 30 days, please call (202) 512-6000 using a touchtone phone. A recorded menu will provide information on how to obtain these lists.**

**For information on how to access GAO reports on the INTERNET, send an e-mail message with "info" in the body to:**

**[info@www.gao.gov](mailto:info@www.gao.gov)**

**or visit GAO's World Wide Web Home Page at:**

**<http://www.gao.gov>**

---

**United States  
General Accounting Office  
Washington, D.C. 20548-0001**

<p><b>Bulk Rate Postage &amp; Fees Paid GAO Permit No. G100</b></p>
---

**Official Business  
Penalty for Private Use \$300**

**Address Correction Requested**

---