

GAO

United States General Accounting Office
Report to Congressional Committees

AD-A257 486



November 1992

MILITARY COMMUNICATIONS

Joint Tactical Information Distribution System Issues



92-29845



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National Security and
International Affairs Division

B-247989

November 12, 1992

The Honorable Sam Nunn
Chairman, Committee on Armed Services
United States Senate

The Honorable Daniel K. Inouye
Chairman, Subcommittee on Defense
Committee on Appropriations
United States Senate

The Honorable Les Aspin
Chairman, Committee on Armed Services
House of Representatives

The Honorable John P. Murtha
Chairman, Subcommittee on Defense
Committee on Appropriations
House of Representatives

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During two earlier reviews of Navy command and control systems,¹ we learned that critical tactical communication links were not coordinated, secure, or resistant to electronic jamming. As a result, we initiated a review of selected Navy tactical communications systems to determine the progress being made to overcome these deficiencies. This report discusses requirement fluctuations, the production decision, and test results associated with the Joint Tactical Information Distribution System (JTIDS). A related report² discusses reliability and production issues associated with the Navy's Milstar terminal program.

Results in Brief

The JTIDS program has experienced fluctuations in the quantity of terminals required, reflecting uncertainty about the Department of Defense's (DOD) joint system needs and priority. They include (1) the Air Force reversing its plans to equip F-15 aircraft with the JTIDS terminal and (2) the Army virtually eliminating its involvement in the JTIDS program,

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¹Navy Command and Control: Better Systems Integration and Organizational Structure Are Needed (GAO/NSIAD-91-115, Feb. 27, 1991) and Navy Command and Control: Data Fusion Needs and Capabilities for Battle Group Commanders (GAO/NSIAD-90-69BR, Mar. 7, 1990).

²Military Satellite Communications: Milstar Program Issues and Cost Saving Opportunities (GAO/NSIAD-92-121, June 26, 1992).

then subsequently increasing its quantities, but with plans to procure terminals at inefficient production rates.

In 1989, DOD decided to begin low-rate initial production³ of JTIDS, even though (1) unsatisfactory test and assessment results indicated that the system was not ready for production and (2) DOD's operational testing staff recommended that production be delayed. A joint Navy and Air Force decision in 1991 to continue low-rate production for a second year was not based on adequate testing or satisfactory test results. In 1992, Navy operational testing, in support of a third year of low-rate production, revealed several significant system deficiencies the testers considered alarming. Production was nevertheless continued.

After three operational tests, JTIDS' operational effectiveness and suitability,⁴ the two criteria that are essential for justifying system production, have yet to be satisfactorily demonstrated. In addition, JTIDS' cost-effectiveness is questionable because of (1) the uncertainty associated with DOD's joint system needs and priority, (2) unsatisfactory test results, and (3) plans for the smaller, lighter weight, and less costly Multifunctional Information Distribution System.

Background

The JTIDS program is intended to provide a system for displaying tactical information, such as the position and identification of air targets and selected friendly forces, to a variety of Army, Navy, Air Force, and Marine Corps users. More specifically, JTIDS consists of a family of terminals for fighter aircraft, ground and airborne command and control centers, and surface air defense units to provide secure, jam-resistant data and voice communications.

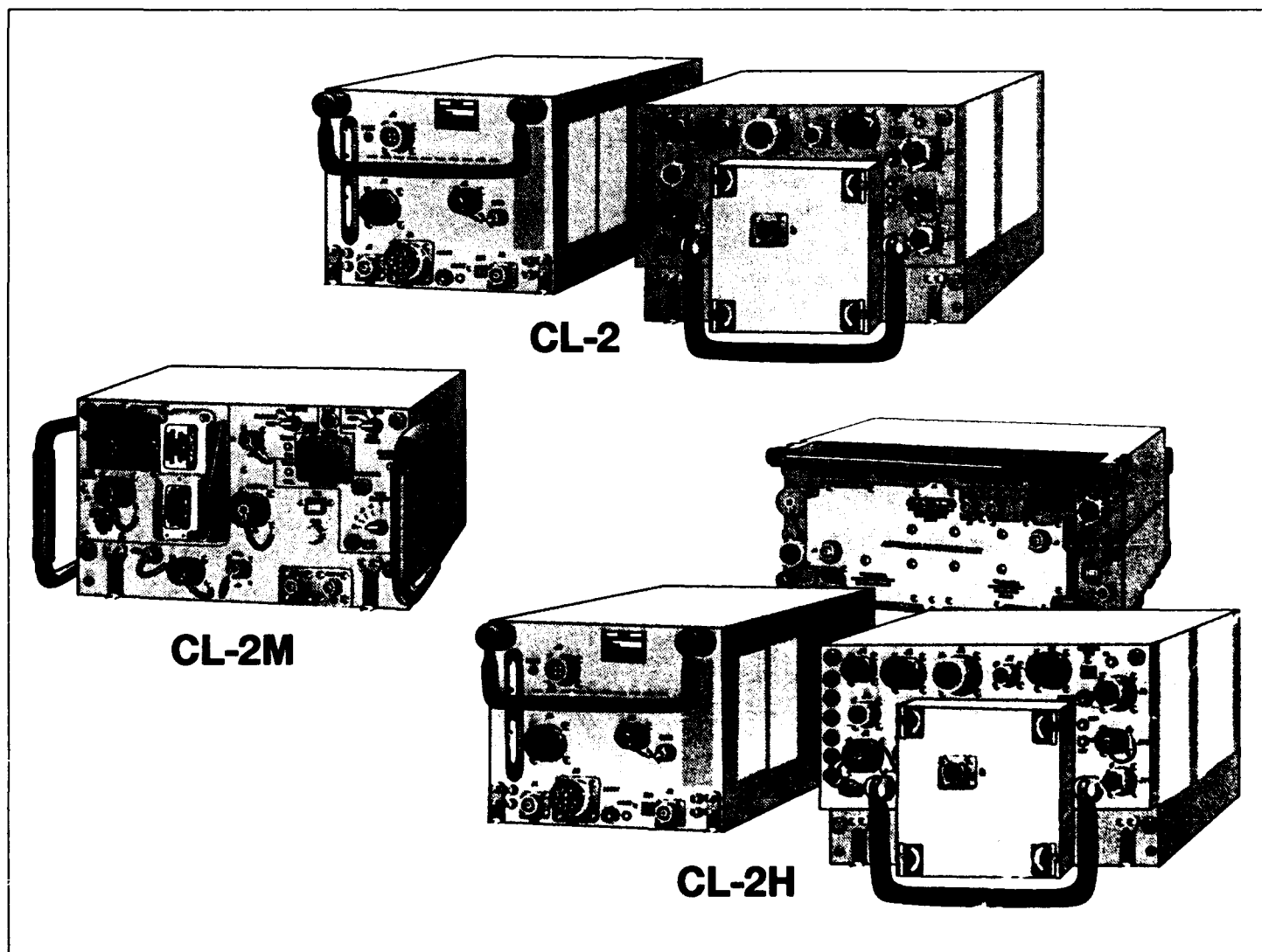
In 1975, the Office of the Secretary of Defense designated the Air Force as the lead service to develop JTIDS. The first generation of terminals was designated as class 1. The size and weight of these terminals made them unsuitable for use in fighter aircraft and mobile ground platforms.

³Low-rate initial production, as defined in 10 U.S.C. 2400, means production of a system in the minimum quantity necessary to (1) provide production-representative articles for operational testing and evaluation, (2) establish an initial production base, and (3) permit an orderly increase in the production rate upon successful completion of operational testing.

⁴Operational effectiveness is the degree to which a system can accomplish its mission when used by representative personnel in the intended combat environment. Operational suitability is the degree to which a system can be placed satisfactorily in field use considering such measurements as reliability, availability, maintainability, and supportability.

In the late 1970s, the JTIDS joint program office began developing a second generation of smaller terminals. As development progressed, two terminals emerged—classes 2 and 2H. The main difference is that the 2H terminals have a high-power amplifier primarily for command and control platforms to transmit information at a greater range. In the mid-1980s, the Army changed its requirements, resulting in the need for even smaller and lighter weight terminals, which were designated as class 2M. Figure 1 shows the class 2 family of JTIDS terminals.

Figure 1: JTIDS Family of Terminals



Source: Department of Defense.

DOD revised the JTIDS program baseline in July 1991 and estimated that program acquisition costs for the class 2 family of terminals would total more than \$3.7 billion. This included about \$2.1 billion in research, development, testing, and evaluation and almost \$1.6 billion to procure 971 terminals. This cost estimate is shown in DOD's selected acquisition report to the Congress, but current procurement estimates are not contained in the reports. DOD representatives stated that procurement

funding for JTIDS is included in the selected acquisition reports of the host platforms.

Requirement Fluctuations Reflect Program Uncertainty

The JTIDS program has experienced several requirement fluctuations in the quantity of terminals. For example, in 1991, the Air Force reversed its plans to equip F-15 aircraft with JTIDS terminals, citing excessive cost, demonstrated reliability problems, and no requirement. According to the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence, Air Force front line fighter aircraft, without JTIDS, may be forced into a secondary support role in future multinational conflicts because the aircraft would lack data link interoperability with other service and allied aircraft.

Within the Army, JTIDS does not have high enough priority to ensure funding at efficient production rates. In 1991, the Army virtually eliminated its involvement in JTIDS by reducing planned procurement from about 700 to 23 terminals. Subsequently, although the quantity was increased, funding was programmed for a minimum production sustaining rate of 48 terminals a year. At this rate, it would take the Army over 14 years to procure its 700 terminals.

The Navy originally planned to procure about 850 terminals, but reduced that quantity by at least 366 terminals because of budget reductions in the F-14D aircraft program. In addition, the Navy plans to install a fully compatible, miniaturized version of JTIDS in its F/A-18 aircraft called the Multifunctional Information Distribution System—a smaller, lighter weight, and less costly terminal.

Production Decision Made Despite Unsatisfactory Test and Assessment Results

The first multiservice operational test⁵ of JTIDS was performed from August 1986 to April 1987 by the Air Force Operational Test and Evaluation Center. The results showed that the class 2 terminals demonstrated some operational effectiveness but were unsuitable in terms of reliability, availability, maintainability, and supportability.

⁵An operational test is a field test of a production-representative item under realistic combat conditions to determine the item's effectiveness and suitability for combat use.

From April to May 1989, the Center performed an operational assessment⁶ of the terminals to support a low-rate initial production decision. The assessment revealed that although some operations had improved since 1987, the number of operating hours were insufficient to establish any confidence in the test results. Accordingly, the Center could not make an adequate assessment of the terminals.

Notwithstanding these unsatisfactory test and assessment results and a recommendation by DOD's operational testing staff that production be delayed, the Under Secretary of Defense for Acquisition approved low-rate initial production in October 1989 for 278 class 2 and 2H terminals. However, the Under Secretary directed that (1) procurement be divided into three consecutive annual lots and (2) the responsible service acquisition executives verify that certain criteria, including scheduled testing requirements, were met before production contracts for lots 2 and 3 could be awarded.

In March 1990, the joint program office awarded lot 1 production contracts to two contractors for a total of 36 terminals.

Production Continued Despite Lack of Adequate Testing

In planning for lot 2 procurement, DOD's test and evaluation master plan,⁷ discussed many test limitations that precluded realistic operational testing. The purpose of the next operational test (referred to as OT IIA) was to assess JTIDS' potential operational effectiveness and suitability including JTIDS' capability to enhance the operations of ships and aircraft. This included assessing the terminals' (1) data handling capacity; (2) ability to exchange data effectively; (3) reliability, availability, maintainability, and supportability; (4) navigational capability; and (5) effects on individual platforms and battle group tactics.

However, the test plan stated that determinations of operational effectiveness and suitability would not be made because test limitations included the immaturity of the full-scale development terminals, small

⁶Operational assessments differ from operational tests. Assessments are essentially observations of trends noted in development efforts, programmatic voids, risk areas, and the ability of a program to support adequate operational testing. These observations are usually based on computer modeling, simulation, document analysis, or any kind of testing, except operational testing.

⁷A test and evaluation master plan is a management document designed to identify and integrate objectives, responsibilities, resources, and schedules for all test and evaluation activities to be accomplished before subsequent key decision points. It is the primary means by which DOD determines the adequacy of test planning.

number of available JTIDS-equipped surface and air platforms, lack of system and platform integration, and absence of a representative threat environment.

Given these acknowledged test limitations, the Navy's Operational Test and Evaluation Force still performed an operational test (OT IIA) on JTIDS during October and November 1990. The resulting test report listed 14 limitations that prevented the testers from determining JTIDS' operational effectiveness and suitability. The limitations included (1) the lack of production-representative terminals; (2) no ships and only a limited number of aircraft to serve as platforms for JTIDS; (3) little or no electronic warfare capability; (4) poor or nonfunctioning navigational capability; (5) insufficient total terminal operating time preventing an assessment of reliability, availability, and maintainability; and (6) contractor-supported rather than service-supported maintenance, logistics, and training.

Although the test report showed that JTIDS was operationally effective in some categories, the system failed most of the operational suitability tests. For example, mission reliability was zero because none of the test platforms were able to complete a full mission without a critical software failure. JTIDS' built-in-test equipment, which is supposed to detect 98 percent of all faults, was extremely unreliable and ineffective. It did not correctly detect or isolate any of the faults, and all the indications that it did provide were erroneous.

Despite the lack of adequate testing and poor test results, the Assistant Secretary of the Navy for Research, Development, and Acquisition and the Assistant Secretary of the Air Force for Acquisition concluded that the program was proceeding according to the planned schedule. In a joint memorandum to the Acting Under Secretary of Defense for Acquisition, signed in April and May 1991, respectively, these executives stated their intention to proceed with the lot 2 contract awards.

Air Force officials told us that the program office awarded lot 2 production contracts in July 1991 to two contractors for 53 terminals.

Recent Operational Testing Demonstrates System Deficiencies

More recent operational testing (referred to as OT IIB) to support the lot 3 contract award for 51 terminals was completed in March 1992 by the Navy's Operational Test and Evaluation Force. The test report concluded that JTIDS has the potential to be operationally effective and suitable, and it

recommended that system development and integration into several JTIDS platforms be continued.

However, the test report stated that the number of significant deficiencies identified was alarming. For example, of 40 deficiencies and recommended improvements in the 1990 operational test, only 9 had been corrected for this 1992 operational test. The test report identified (1) five major deficiencies that need to be corrected before approving the system for limited fleet introduction and (2) 53 additional deficiencies that need to be corrected and verified by more operational testing. The test report also identified 15 test limitations that prevented the resolution of critical operational issues. One of the limitations involved insufficient total operating time, which prevented gathering enough data to fully assess reliability, availability, and maintainability.

Despite these deficiencies, the Navy JTIDS program manager informed us that the lot 3 contract was awarded in late September 1992.

Agency Comments and Our Evaluation

DOD provided written comments on a draft of this report and concurred or partially concurred with the findings, but did not concur with the report's recommendations. (See app. I.)

DOD stated that, in general, we appeared to challenge, without specifically stating so, DOD's acquisition strategy of phased development and testing that the JTIDS program employs. Considering the evidence, we believe DOD's decision to initiate production in 1989 was questionable since there were indications that continued development was necessary. In addition, DOD's "development and test approach" while in low-rate initial production is an unnecessary acquisition strategy of combining or overlapping phases of the acquisition process (called concurrence) that frequently results in costly system redesign or modification.

Nevertheless, given this 1989 production decision, we believe that DOD's strategy of dividing the procurement into three lots, requiring interim operational testing, and establishing criteria to be met before proceeding with subsequent lots was prudent and conservative. However, after two additional operational tests—the first being inadequate and the second demonstrating a continuation of many system deficiencies—the question now is how much additional production is warranted.

DOD stated that virtually all of the reductions in terminal quantities were mandated by decreases in the numbers of host platforms resulting from the transition to a post cold war environment. Considering (1) this changing threat, (2) the resulting program uncertainty associated with DOD's joint system needs and priorities, (3) the unsatisfactory test results, and (4) the possibility of an available and less costly alternative, JTIDS should be rejustified.

DOD disagreed with our draft recommendations to the Secretary of Defense that the JTIDS program should be re-evaluated and the award of additional JTIDS terminal contracts should be prohibited. DOD stated that (1) it constantly evaluates the program, (2) a validated requirement exists, and (3) the terminal is meeting all milestone controls, making steady improvement, and performing as expected. Considering the difference between our views and DOD's position, we replaced our draft recommendations with a matter for congressional consideration.

Matter for Congressional Consideration

The Congress may wish to prohibit DOD from awarding additional JTIDS terminal contracts by denying future procurement requests until (1) operational testing and evaluation demonstrates that the system meets its performance requirements and (2) DOD rejustifies the system through a cost and operational effectiveness analysis of alternatives.

Scope and Methodology

Our evaluation of JTIDS focused on procurement decisions and plans and system test results. We analyzed decision papers, requirements documents, test plans and reports, command and control plans, budget information, and various correspondence at the Office of the Secretary of Defense and the Department of the Navy, Washington, D.C.

We interviewed JTIDS program representatives in the Office of the Chief of Naval Operations, Office of the Navy Comptroller, Navy's Space and Naval Warfare Systems Command, and Navy's Operational Test and Evaluation Force. We also visited the JTIDS joint program office at Hanscom Air Force Base, Massachusetts. We performed our review in accordance with generally accepted government auditing standards and included information to September 1992.

We are sending copies of this report to the Secretary of Defense; the Director, Office of Management and Budget; and other interested congressional committees. We will also make copies available to others upon request.

This report was prepared under the direction of Louis J. Rodrigues, Director, Command, Control, Communications, and Intelligence Issues, who may be reached on 202-275-4841 if you or your staff have any questions concerning this report. Other major contributors to this report are Homer H. Thomson, Assistant Director; Kent L. Fixman, Evaluator-in-Charge; and Richard O. Kuhn, Evaluator.



Frank C. Conahan
Assistant Comptroller General

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

September 25, 1992

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 the General Accounting Office (GAO) draft report, "TACTICAL COMMUNICATIONS: DoD Management Action Needed on Joint Tactical Information Distribution System Program," dated July 30, 1992 (GAO Code 395165), OSD Case 8996. The DoD concurs or partially concurs with all the draft report findings, but does not concur with the two recommendations. The Department is actively addressing all issues discussed in the GAO report through self-initiated and previous actions on the part of all the Military Services. Although most of the information in the report is accurate, the GAO findings appear to have been chosen selectively and, in many instances, do not represent the current state of the Joint Tactical Information Distribution System program. In some instances, the conclusions do not appear to be supported by the findings. In general, without specifically stating so, the GAO appears to be challenging the DoD phased development and testing approach that the Joint Tactical Information Distribution System program employs, which is unfortunate. The phased acquisition strategy has proven to be very effective for this particular program.

The GAO chronicles fluctuating and diminishing Service support for the Joint Tactical Information Distribution System program by citing the reductions in production terminal quantities that have occurred over the last 3 years. Virtually all of those reductions were mandated by decreases in the number of host platforms, due to the impact of transitioning to a Post-Cold War environment. Termination of F-14D and E-2C aircraft production, for example, should not be interpreted as waning Navy requirements for the Joint Tactical Information Distribution System. In fact, the strong Navy support for the program is evidenced by its lead service status in the down-sized version of the Joint Tactical Information Distribution System terminal, the Multifunctional Information Distribution System-Low Volume Terminal program. Several Army studies have shown the Joint Tactical Information Distribution System meets Army air defense requirements and that there is no other satisfactory solution. All the Services have documented requirements for the Joint Tactical Information Distribution System, but are currently trying to define the quantities necessary to support tactical communications requirements in light of the

**Appendix I
Comments From the Department of Defense**

changing Post-Cold War command and control threat and doctrine. While additional Service review of terminal quantities may be necessitated by Post-Cold War analysis, the DoD does not concur that re-evaluation of the system is warranted at this time.

The GAO also discusses operational testing of the Joint Tactical Information Distribution System terminal and concludes that the Low Rate Initial Production decision of the Defense Acquisition Board was premature and that further production should not continue until the Secretary of Defense re-evaluates the Joint Tactical Information Distribution System program. The Department disagrees. It is the DoD position that the operational testing has proven that the Defense Acquisition Board decisions for a phased development approach to the system, the reliability growth program, and the multiple integration efforts were prudent, and the development strategy is working well. The Joint Tactical Information Distribution System terminal hardware is reliable and the software and integration efforts are on schedule. There is no reason to stop production and divert from the original program structure of phased development and testing coupled to incremental Low Rate Initial Production decision controls.

Detailed DoD comments on the report findings and recommendations are provided in the enclosure. The Department appreciates the opportunity to comment on the draft report.

Sincerely,



Duane P. Andrews

Enclosure

GAO DRAFT REPORT - DATED JULY 30, 1992
(GAO CODE 395165) OSD CASE 8996

"TACTICAL COMMUNICATIONS: DOD MANAGEMENT ACTION NEEDED ON
JOINT TACTICAL INFORMATION DISTRIBUTION SYSTEM"

DEPARTMENT OF DEFENSE COMMENTS

FINDINGS

- **FINDING A: Joint Tactical Information Distribution System.** The GAO reported that the Joint Tactical Information Distribution System consists of a family of terminals for fighter aircraft, ground and airborne command and control centers, and surface air defense units to provide secure, jam-resistant data and voice communications. The GAO noted that, currently, no single system or collection of systems has the capability intended for the Joint Tactical Information Distribution System. The GAO also observed that, in 1975, the Air Force was designated as the lead service to develop the system. The GAO also observed that the first generation (class 1) terminals were too large and heavy for use in tactical aircraft and mobile ground platforms. The GAO reported that, in the late 1970's, smaller terminals began development (classes 2 and 2H). The GAO noted, however, that in the mid-1980s the Army changed its requirements -- resulting in the need for even smaller and lighter weight terminals (class 2M). (pp. 2-3/ GAO Draft Report)

DoD Response: Concur.

- **FINDING B: Requirement Fluctuations Reflect Program Uncertainty.** The GAO reported that the Joint Tactical Information Distribution system program has experienced several quantitative requirement fluctuations -- reflecting uncertainty about the DoD system needs. As an example, the GAO cited the 1991 Air Force decision not to equip its F-15 aircraft with Joint Tactical Information Distribution System terminals because of (1) excessive cost, (2) demonstrated reliability problems, and (3) the lack of a requirement. The GAO noted that, according to the Assistant Secretary of Defense (Command, Control, Communications, and Intelligence), without the system, Air Force fighters may be forced into a secondary support role in future multinational conflicts. The GAO also concluded that, within the Army, the Joint Tactical Information Distribution System does not have high enough priority to ensure funding at efficient production rates. The GAO found that, in 1991, the Army reduced its planned procurement from about 700 to 23 terminals -- and, although the quantity subsequently has been increased, funding was programmed for a minimum production sustaining rate of 48 terminals a year.

In addition, the GAO pointed out that the Navy originally planned to procure about 850 terminals, but the quantity was reduced by at least 366 because of budget reductions in the F-14D aircraft program. The GAO found that the Navy also plans to install a fully compatible, miniaturized version of the Joint Tactical Information Distribution System in its F/A-18 aircraft.

Finally, the GAO reported that the July 1991 revised baseline program estimate is \$3.7 billion. The GAO observed that, while the DoD September and December

Enclosure

Now on pp. 2-3.

Now on pp. 4-5.

See comment 1.

1991 selected acquisition reports showed about \$2 billion for research, development, testing, and evaluation, they included nothing for procurement, reflecting the uncertainty about the total quantity. (p.4 / GAO Draft Report)

DoD Response: Partially concur. Air Force intentions not to equip the F-15C/D fighter fleet with the Joint Tactical Information Distribution System Class 2 terminals were known in 1988. The 1989 Defense Acquisition Board for the Joint Tactical Information Distribution System convened with full knowledge of Air Force intentions not to procure more than 34 fighter terminals from Lot 1 of the Low Rate Initial Production. In a 1991 memorandum, the Air Force provided alternative plans for the disposition of the terminals, since they no longer intended to use the terminals in any fighters. In the memorandum, the Air Force declared that it did not have a requirement for the Joint Tactical Information Distribution System, since Air Force doctrine for fighter employment emphasizes operations under decentralized control, with the flight leader responsible for mission execution. The Air Force memorandum went on to say, however, that the Service has a strong requirement for the Joint Tactical Information Distribution System capability in its Command and Control platforms and is planning to meet those requirements. Currently, the Air Force is looking at the utility of fighter data links in an Operational Utility Evaluation using F-15s equipped with Joint Tactical Information Distribution System Class 2 terminals in the Composite Wing at Mountain Home Air Force Base, Idaho. Given changing threats, downsized forces, and reduced budgets, all the Services are rethinking the use of Joint Tactical Information Distribution System data links in support of new fighter aircraft mission and roles.

The Army requirement for Joint Tactical Information Distribution System Class 2M terminals has and continues to fluctuate. The Army continues to state that it has a Joint Tactical Information Distribution System requirement for approximately 700 terminals. Currently, the Army fielding requirements for joint air defense interoperability in the next 5 years is for approximately 72 Joint Tactical Information Distribution System Class 2M terminals, which will provide the "air picture" for ground air defense forces. The remaining Army requirement for Joint Tactical Information Distribution System Class 2M terminals is unfunded. The Army is currently reviewing its data transport needs in light of post-cold war command and control threat and doctrine, and is conducting system and operational tests to determine theater battlefield communications requirements. Several Army studies have already shown that the Joint Tactical Information Distribution System Class 2M terminal meets Army air defense requirements and that there is no other satisfactory solution. While additional review of quantities may be necessitated by the Army Post Cold War Command and Control Review, further study regarding the appropriateness of the Joint Tactical Information Distribution System is not warranted at this time.

The DoD recognizes that Navy Joint Tactical Information Distribution System requirements have also varied. Although the GAO stated numbers of the previous and current Navy terminal procurements are not exact, it is nonetheless true that the numbers have dropped significantly over the life of the Joint Tactical Information Distribution System program. The GAO finding that the Navy is pursuing development and procurement of a downsized Joint Tactical Information Distribution System terminal, the Multifunctional Information Distribution System - Low Volume Terminal, to provide Link 16 implementation in other aircraft is correct. The Multifunctional Information Distribution System - Low Volume Terminal is an international cooperative development program to

provide a Joint Tactical Information Distribution System capability for space constrained fighters and other platforms. That program will provide Link-16 interoperability for the fighters of the participating nations: France, Italy, Germany, Spain, and the US. For that reason, the DoD does not concur those efforts can be construed to be evidence of fluctuating and waning Navy support for the Joint Tactical Information Distribution System. On the contrary, the facts are indicative of the large reductions in the numbers of host platforms and the strong Navy commitment to fielding Link 16, including both the Joint Tactical Information Distribution System and the Multifunctional Information Distribution System - Low Volume Terminal.

The Joint Tactical Information Distribution System Approved Program Baseline and Selective Acquisition Report comply with different budgetary requirements. The Approved Program Baseline includes both research and development funds and procurement funds. The Selective Acquisition Report report includes only research and development funds. The GAO report incorrectly notes that procurement funding has dropped from the Selected Acquisition Reports for Joint Tactical Information Distribution System. The GAO fails to understand that procurement funding is listed in the Joint Tactical Information Distribution System Approved Program Baseline and in the Selected Acquisition Reports of the host platforms. Joint Tactical Information Distribution System terminal procurement funds are managed and controlled by the respective Service platform manager. There is no more "reflected uncertainty" in the Joint Tactical Information Distribution System program than with any other major acquisition category I program -- all are under constant review in today's declining budget environment and rapidly changing world situation.

- **FINDING C: Production Decision Made Despite Unsatisfactory Test and Assessment Results.** The GAO reported that a multi-service operational test, conducted between August 1986 and April 1987, indicated the class 2 terminals demonstrated some operational effectiveness, but were unsuitable in terms of reliability, availability and supportability. The GAO found that an April to May 1989 operational assessment was conducted for an insufficient number of operating hours to establish any confidence in the test results. The GAO observed that, notwithstanding the unsatisfactory test and assessment results and a recommendation against production by the DoD operational testing staff, low-rate initial production was approved in October 1989 for Class 2 and Class 2H terminals. The GAO noted that the Under Secretary of Defense for Acquisition directed that (1) procurement be divided into three annual lots, and (2) the responsible Service Acquisition Executives verify that certain criteria, including scheduled testing requirements, were met before production contracts for lots 2 and 3 could be awarded. The GAO found that, in March 1990, the joint program office awarded lot 1 for a total of 36 terminals. (pp. 5-6/ GAO Draft Report)

DoD Response: Partially concur. The DoD agrees with the GAO discussion of the 1986-1987 Joint Tactical Information Distribution System terminal Initial Operational Test and Evaluation results, which yielded unsuitable reliability, availability, and supportability ratings. The DoD does not agree, however, that those dated results should be used to support conclusions regarding the terminal as it now exists in 1992. The reliability and availability of the terminal have been greatly improved by the Defense Acquisition Board mandated Reliability Growth Plan. The improvements in terminal performance have been demonstrated and documented in the 1990-1992 series of paired Development Tests and Operational Tests, as prescribed by the jointly approved October 1990 Test and

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See comment 2.

Evaluation Master Plan. In the 1986-1990 timeframe cited in this finding, the fact that the test community found the terminal to be logistically unsupportable was not a major concern as it was a new piece of equipment not yet introduced to the fleet or supported by the supply and maintenance system. The major concern of the test community at that time was the desire for more joint, multi-platform testing to be incorporated into the Test and Evaluation Master Plan.

The cited 1986-1987 Initial Operational Test and Evaluation demonstrated the required functionality for the Joint Tactical Information Distribution System terminal, as evidenced by the testers terminal rating of "potentially operationally effective". With the Reliability Growth Plan aimed directly at the reliability and availability problems of the Joint Tactical Information Distribution System terminal, the other appropriate measure to take was to begin building "production representative terminals" to meet the requirements of future operational testing and to obtain the improved reliability benefits of production line manufacturing over "model maker" assembly of an engineering development terminal. Defense Acquisition Board approval of the Low Rate Initial Production was based on those two reasons, which are in accordance with DoD acquisition regulations. The Defense Acquisition Board approval of the Low Rate Initial Production was the appropriate decision at the time. It should be noted that the GAO argues against a Low Rate Initial Production decision here, but in a later finding highlights the lack of production representative terminals.(Finding D)

The DoD does not agree with the GAO finding that attributes all Joint Tactical Information Distribution System terminal failures to the terminal itself. The report does not address the complex hardware and software integration efforts involving multiple, dissimilar platforms. The Defense Acquisition Board recognized the maturity of the terminal and the difference between procurement of a terminal and fleet introduction of a system. As noted by the GAO, the Defense Acquisition Board Acquisition Decision Memorandum of October 1989 directed each Service Acquisition Executive to verify the satisfactory progress of integration of the terminal into the various platforms before approving the next phase of Low Rate Initial Production. The DoD is confident that the phased program controls have effectively ensured a successful development and test approach for this complex system.

- **FINDING D: Production Continued Despite Lack of Adequate Testing Plan.** The GAO reported that, in planning for the lot 2 procurement, the DoD prepared a Test and Evaluation Master Plan, which discussed several test limitations that precluded testing in a realistic operational environment. The GAO noted the test plan also stated that determinations of operational effectiveness and suitability would not be made because of test limitations. The GAO found that the report of the October to November 1990 operational test listed 14 such limitations, including (1) the lack of production representative terminals, (2) no ships and only a limited number of aircraft as platforms, (3) little or no electronic warfare capability, (4) poor or non-functioning navigational capability, (5) small total terminal operating time (so that reliability, availability, and maintainability could not be assessed), and (6) contractor-supported rather than Service-supported maintenance, logistics, and training. The GAO observed that, although the test report did show the system demonstrated some operational effectiveness, it failed most of the operational suitability tests. The GAO cited as examples zero mission reliability because none of the platforms were able to complete a full mission without a critical software failure, and extremely unreliable and

Now on pp. 6-7.

See comment 3.

ineffective built-in-test equipment that did not correctly detect or isolate any faults. The GAO found that, despite the lack of adequate testing and poor test results, the Navy and Air Force Acquisition Executives determined that the program was proceeding according to the planned schedule, and lot 2 production contracts were awarded for 53 terminals. (pp. 6-7/ GAO Draft Report)

DoD Response: Partially concur. The GAO ignores the DoD phased development and testing approach used for the Joint Tactical Information Distribution System program. The DoD recognizes that the full effectiveness and suitability of the Joint Tactical Information Distribution System terminal will not be tested until the Navy Operational Evaluation tests are conducted. The test in question was the first of three scheduled Test and Evaluation Master Plan Operational Tests which precede the Navy Operational Evaluation. The first test was structured to assess terminal development progress and to justify continuation of the Low Rate Initial Production Decision based on demonstrated performance. The test provided four separate, actual or representative platforms in a realistic test deliberately scoped to minimize cost, while demonstrating a potentially effective and suitable system. The test demonstrated the ability of the system to establish and maintain multi-platform connectivity without interference and the ability of all platforms to exchange Tactical Data Link-16 messages with each other. The Operational Test also verified predicted system improvements in reliability due to the Reliability Growth Program.

The DoD does not agree with the GAO comment regarding Joint Tactical Information Distribution System terminal suitability. The cited testing limitation concerning contractor supported maintenance vice fleet maintenance, logistics, and training is not inappropriate or unusual for a system in the early stages of Low Rate Initial Production. Also, the GAO comment regarding the failure of the system to meet availability criteria for fleet introduction is not germane, since fleet introduction was not the goal of that phase of the test program.

In addition, the DoD does not agree with the GAO comments about the Built -In-Test performance of the terminal. While the DoD agrees that there were excessive terminal false alarms due to highly sensitive monitoring of Electromagnetic Compatibility thresholds, the contractor did use the Built -In-Test capability to isolate terminal problems, which normally can be expected at that stage of terminal development.

- **FINDING E: Recent Operational Testing Demonstrates System Deficiencies.** The GAO reported that operational testing to support the lot 3 contract award was completed in March 1992. The GAO noted, however, that according to the test community, the number of significant deficiencies identified was alarming -- and did not support the introduction of the system into the fleet until corrections were made. The GAO found that, of the 40 deficiencies and recommended improvements identified in the 1990 operational test, only nine were corrected for the 1992 operational test. The GAO reported that (1) system reliability, maintainability, and availability were not fully assessed, (2) systems software was unreliable, and (3) the built-in-test equipment did not work. (p.7/GAO Draft Report)

Now on pp. 7-8.

See comment 4.

DoD Response: Partially concur. The DoD agrees that the recent operational testing identified some system deficiencies. The DoD cannot, however, agree with the GAO equating the correction of only 9 of 40 deficiencies and recommended improvements from the 1990 Operational Test series with

unsatisfactory program progress. The report makes no attempt to delineate those recommendations that were determined by the Navy to be outside the scope of the program and will not be corrected, or those which are designated for correction prior to Navy Operational Evaluation. In fact, the 1992 Operational Test report withholds recommendation for fleet introduction until correction of only five Joint Tactical Information Distribution System terminal deficiencies. Those five deficiencies will be corrected prior to completion of testing.

The GAO also ignored comments (which include those of the Commander Operational Test and Evaluation Force) that the Joint Tactical Information Distribution System "has the potential to be operationally effective, and the potential to be operationally suitable" and "OT-IIB test results support a recommendation for continued system development and integration into AEGIS C&D cruisers, ACDS Block 0, E-2C Group 2, and F-14D." Those were the best findings that the Navy could expect to receive from the test community at that stage of the scheduled Operational Test series. The recommendation by the test community against fleet introduction of the Joint Tactical Information Distribution System terminal was expected, since there was no intent at that stage of the test series to request fleet introduction.

The GAO further ignores the demonstrated reliability and availability successes. In the 1992 Operational Test series, the participating ships had no Joint Tactical Information Distribution System terminal hardware failures. Several platforms in the test series met or exceeded a 0.95 Ao, which renders invalid the GAO statement that system software was unreliable. Both multi-service and Anti-Jam testing were also conducted successfully during the test series. Again, Built-In Test did work and was used by the contractors to troubleshoot a total of three system failures during the entire test series.

RECOMMENDATIONS

- **RECOMMENDATION 1:** The GAO recommended that -- because of requirements fluctuations that reflect program uncertainty, the fact that after several attempts system operational effectiveness and suitability have not been satisfactorily demonstrated, and the need to avoid unnecessary procurement and costly redesign or modifications -- the Secretary of Defense re-evaluate the Joint Tactical Information Distribution System to determine whether it is still the right system to satisfy the requirement or whether alternatives should be explored. (p.8/ GAO Draft Report)

DoD Response: Non-concur. The Office of the Secretary of Defense constantly evaluates and controls the progress of all major programs, such as the Joint Tactical Information Distribution System program, through the Defense Acquisition Board and the Defense Acquisition Executive Summary reviews. Those reviews have determined, in conjunction with the Services, that a validated requirement exists for the Joint Tactical Information Distribution System and that the terminal has met or is meeting all the required system acquisition milestone controls and continues to support documented Service testing requirements. The DoD does not agree that a re-evaluation of the program is required at this time.

- **RECOMMENDATION 2:** The GAO recommended that the Secretary of Defense prohibit additional Joint Tactical Information Distribution System terminal

See comment 5.

See comment 5.

contracts from being awarded until the re-evaluation is completed and operational testing and evaluation demonstrates that the system will perform as intended. (p. 8/ GAO Draft Report)

DoD Response: Non-concur. While the GAO apparently does not agree DoD acquisition executives have set reasonable and prudent limits on system production to allow the phased build and test strategy to be successful, it is the DoD contrary position that the Joint Tactical Information Distribution System terminal is performing as expected and in accordance with the Test and Evaluation Master Plan directed sequence of development and operational tests.

There is no reason to stop production and divert from the original program structure of phased development and testing coupled to incremental Low Rate Initial Production decision controls. The progress of the Joint Tactical Information Distribution System development and test strategy has been closely monitored prior to each procurement decision. Testing of the terminal indicates steady improvement that conforms to predicted reliability growth and the test community cites "correctability" of known discrepancies. Furthermore, the test agencies state the system is "potentially operationally suitable and potentially operationally effective." Delay or deferral of continued development, procurement or testing of the terminal would needlessly drive up costs, while duplicating the intent and efforts of the build and test strategy. The Joint Tactical Information Distribution System terminal has met, or is meeting, all the required system acquisition milestones and continues to support documented Service testing requirements.

GAO Comments

The following are GAO's comments on the Department of Defense's letter dated September 25, 1992.

1. DOD acknowledged the Air Force's historical lack of commitment to the JTIDS program for fighter aircraft, but emphasized the Air Force's strong requirement for the system in command and control aircraft. DOD also acknowledged that the Army's requirement for JTIDS continues to fluctuate, stating that only 10 percent of the requirement is funded. In our view, these facts point to uncertainty regarding the extent of the Air Force's need and the Army's priority in the joint program. We recognize that the Navy has been committed to JTIDS for some time and that its reduction in terminals was primarily due to host platform reductions. We did not intend to imply that Navy support for the program was waning.

DOD representatives informed us that JTIDS' current program cost estimates were contained in separate selected acquisition reports. Current research and development funding information is shown in the JTIDS selected acquisition reports, but current procurement funding information is included in the selected acquisition reports of the host platforms. We corrected our report to reflect this.

2. We did not use the multiservice operational test data of 1986-1987 to support a conclusion regarding the JTIDS terminal as it now exists in 1992. Instead, we used this data and subsequent evidence to show that DOD's decision to initiate production at that time was questionable. There were indications that continued development was necessary.

Nevertheless, given the low-rate initial production decision, we believe that DOD chose a prudent and conservative approach by dividing the procurement into three lots and establishing criteria to be met before proceeding with the second and third lots (referred to by DOD as phased program controls). In its comments, however, DOD characterized this low-rate initial production as a "development and test approach," which indicates that DOD recognized the need for continued JTIDS development—a function that should have been nearly completed before beginning production. Combining or overlapping the development and production phases of the acquisition process frequently creates excessive program risk that can result in costly and unnecessary system redesign or modification.

Our assessment of terminal failures from the various test reports was not limited to the terminal hardware, as DOD implies. Instead, from an

operational test viewpoint, it is important to consider both hardware and software on a combined basis, that is, whether the complete system can perform as intended. If software is unreliable, the complete system is unreliable, regardless of hardware performance.

3. As discussed in comment 2 above, we did not ignore DOD's phased approach to low-rate initial production in controlling the JTIDS program. Instead, we agree that intermittent operational testing is prudent to aid decisionmakers regarding the procurement of additional terminal lots. Although some progress in achieving terminal maturity may have been made, it is reasonable to expect that greater progress should have been made before continuing production. Operational testing is designed to determine system effectiveness and suitability. However, in our view, since (1) the test plan warned that such a determination could not be made because of test limitations, (2) the actual test demonstrated that the limitations stated in the plan were real, and (3) overall test results were poor, the decision to proceed with lot 2 production was questionable.

The example of contractor-supported, rather than service-supported, maintenance was one of several test limitations reported by the Navy's operational test agency. The reason is that Navy operational test regulations call for using fleet personnel for maintenance. Regarding availability criteria for fleet introduction, we believe DOD's comment is referring to OT IIB (not OT IIA), which is discussed in comment 4 below and was intended to assist in making a decision on lot 3 procurement. Although fleet introduction may not have been a goal pertaining to OT IIB, the test agency specifically made the point that the test results did not support a recommendation for limited fleet introduction until major deficiencies were corrected.

Regarding the built-in test equipment performance, we reported what the Navy's operational test agency stated. Although the contractor may have used the equipment, the test agency did not find the result acceptable.

4. Although we agree that DOD is making some progress in correcting system deficiencies, the OT IIB test report indicated that many deficiencies remain to be resolved. The report (1) characterized JTIDS as being potentially operationally effective and suitable and (2) recommended continued system development and integration into several different host platforms. We have added this information to our report, but it does little to prove that JTIDS is achieving sufficient progress or demonstrating satisfactory system performance to warrant continued production.

Regarding terminal hardware reliability, the test report showed no failures for the participating ships, but it did show a mean time between failure of 21 to 23 hours for participating aircraft when the criterion is 102 hours or greater.

Regarding terminal availability, the report showed that some platforms exceeded the criterion of 0.90 or greater, but other platforms' availability ranged from 0.68 to 0.79. Although we agree that the availability formula takes system software performance into account, there is no criterion for software reliability, which is obviously critical to successful total system performance. We noted that JTIDS encountered several software failures. For example, F-14D aircraft only completed 3 of 15 missions without a major software failure or fault, resulting in being 20 percent reliable. Mission reliability for other aircraft and ships ranged from 56 percent to 89 percent. From a maintainability viewpoint, the test report stated that built-in test equipment was not tested because of known errors causing critical software failures.

5. We dropped our recommendations to the Secretary of Defense and substituted a matter for congressional consideration.