United States General Accounting Office

GAO

Report to the Chairman, Committee on Armed Services, House of Representatives

September 1988

CLOSE AIR SUPPORT

Upgraded A-7 Aircraft's Mission Effectiveness and Total Cost Unknown

GAO/NSIAD-88-210

GAO

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National Security and
International Affairs Division

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

Dear Mr. Chairman:

This report, which was prepared at your request, addresses the status of Air Force's efforts to upgrade its close air support aircraft, the A-7. A separate report (GAO/NSIAD-88-211) addresses the Air Force's efforts to replace its A-10 aircraft.

As arranged with your Office, unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days from the date of the report. At that time we will send copies to interested congressional committees; the Secretaries of Defense, the Air Force, and the Army; the Director, Office of Management and Budget; and other interested parties.

Sincerely yours,

Frank C. Conahan
Assistant Comptroller General

Executive Summary

Purpose

The Air Force proposes to upgrade the A-7 aircraft to help meet the air support needs of ground forces in the 1990s and beyond. The Congress is concerned about the aircraft's cost effectiveness in meeting this need.

The Chairman of the House Committee on Armed Services asked GAO to identify the close air support requirements and the Air Force's plans to replace or upgrade its close support aircraft, the A-10 and A-7. This report addresses the A-7 upgrade; a separate report addresses the close air support requirements and the A-10 replacement. GAO prepared separate reports because the issues associated with each aircraft are sufficiently different and significant.

Background

The threat of most concern to U.S. forces is a Warsaw Pact or Soviet invasion in central Europe. A key U.S. strategy to counter this threat is to have air attacks against the enemy at the front—known as close air support—and behind enemy lines—known as battlefield air interdiction—to interrupt reinforcements to the main battle area.

The Air Force is concerned that the A-10 and the A-7, its aircraft designated to perform the close air support and battlefield air interdiction missions, will be inadequate to perform in the projected Soviet air defense threat of the 1990s. According to the Air Force, the A-7 lacks the thrust to maintain the speed and maneuverability needed to survive.

After evaluating aircraft options, the Air Force recommended to the Department of Defense that it replace the A-10s and upgrade the A-7s. The Department approved the development and testing of two upgraded A-7 prototypes and further study of the A-10 replacement. The upgraded A-7, known as the A-7 PLUS, would have structural, engine, and avionics changes to improve the aircraft's capabilities. Current Air Force plans call for the A-7 PLUS to be available beginning in 1991. However, according to A-7 PLUS program management officials, this milestone will probably slip to 1993.

Results in Brief

The Air Force has simulated the A-7 PLUS' performance and compared it to the performance of other aircraft on similar missions, but it has not evaluated the aircraft's mission effectiveness against the latest scenarios and related close air support and battlefield air interdiction requirements. The Department of Defense approved the latest mission requirements for the 1990s and beyond in December 1987 as part of the A-10 replacement study. The Department plans to use the requirements

to determine whether a new aircraft is more cost effective and survivable for close air support and battlefield air interdiction missions than a derivative of an existing aircraft.

The total cost of the A-7 PLUS is not known because (1) the Air Force has not decided on avionics and engine options, (2) studies on radar improvements, aircraft rewiring, and aircraft vulnerability could lead to additional aircraft modifications, and (3) the production schedule is uncertain. Costs to upgrade the A-7 are estimated at about $4.9 billion, or $14.6 million per aircraft. This amount includes $178 million for two prototype aircraft.

Public Law 100-180 specifies that no more than $10 million of funds appropriated or otherwise made available for fiscal year 1988 may be obligated for the A-7 PLUS program until the Secretary of Defense certifies to the aircraft's cost effectiveness in performing the close air support and battlefield air interdiction missions, among other matters. Once decisions are made on cost and schedule, an evaluation of the aircraft against the latest scenarios and related mission requirements could help the Air Force clarify the overall cost effectiveness of the A-7 PLUS for the Secretary's certification.

Principal Findings

Mission Effectiveness

The Air Force has a contract to develop two A-7 PLUS prototypes to evaluate the engineering feasibility of aircraft changes. The Air Force's Tactical Air Command has not identified specific operational performance requirements that the A-7 PLUS must meet. The contract for the prototypes requires performance capabilities that are no better than those of the A-7. Indeed, the criterion that the contractor must meet is that the upgrade will not degrade the existing performance of the A-7. The Air Force expects that the A-7 PLUS will perform better than the A-7. Those expectations are based on contractor engineering estimates.

The A-7 PLUS' projected capabilities have not been evaluated against the latest close air support and battlefield air interdiction scenarios and related mission requirements. The Tactical Air Command had not done so because it did not (1) have the mission requirements when it decided on the aircraft, (2) have the resources to conduct the evaluation, and (3)

believe that it was needed, since the aircraft would probably meet most requirements.

Preliminary contractor estimates show that the A-7 PLUS prototype has more vulnerable area than the A-7. The contractor believes that with design changes beyond those programmed, the A-7 PLUS could have less vulnerable area than the A-7.

Total Costs Unknown

The Air Force has estimated the cost of upgrading the A-7 at $4.7 billion in prices current at the time of purchase. This amount does not include the cost of the prototypes, estimated at $178 million. The additional cost would increase total cost to $4.9 billion. However, the total could change depending on the engine and avionics options selected and decisions on the need for additional rewiring of the aircraft, a new or modified radar, and design changes to reduce the aircraft's vulnerability.

Production Schedule and Budget Requirements Unknown

Current Air Force plans call for the first A-7 PLUS to be available in 1991. However, meeting this milestone is virtually impossible because of delays in production funding. For example, unless the Secretary of Defense makes certain certifications, 1988 funds may not be used for the program. The revised schedule being considered within the Air Force would delay delivery of the first aircraft until May 1993.

Because of cost and schedule uncertainties, the Air Force has been unable to finalize its total budgetary requirements.

Recommendation

Since the purpose of the A-7 PLUS is to meet the close air support and battlefield air interdiction mission requirements of the 1990s, GAO recommends to the Secretary of the Air Force that the A-7 PLUS' mission effectiveness be evaluated against the latest scenarios and related mission requirements. The results of the evaluations could be used to assess the aircraft's cost effectiveness in performing the close air support and battlefield air interdiction missions, as required by Public Law 100-180.

Agency Comments

The Department of Defense concurred with GAO's recommendation and concurred with most of its findings. It stated that the Air Force is performing the evaluation recommended by GAO and that this evaluation is expected to be completed by December 31, 1988.

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Abbreviations

BAI	battlefield air interdiction
CAS	close air support
GAO	General Accounting Office
TAC	Tactical Air Command

Introduction

In 1984 the Air Force initiated a series of evaluations of aircraft options to improve air support to ground operations. The evaluations were initiated because the Air Force was concerned about the adequacy of its current aircraft, the A-10 and the A-7, to perform air operations in direct support of evolving battle needs, given the projected Soviet air defense threat of the 1990s. In December 1986 the Air Force recommended that the Department of Defense (1) upgrade approximately 337 Air National Guard and active Air Force A-7 aircraft with improved engines and avionics, thereby extending the aircraft's service life by 20 years and (2) replace over 600 A-10s with modified F-16s.

The Office of the Secretary of Defense approved the development and testing of two upgraded A-7 prototypes, but it did not approve full-scale development of the aircraft. Prototyping was intended to address concerns about the aircraft's vulnerability (i.e., its probability of being shot down if hit) and the risks associated with engine and structural changes. The Office of the Secretary also directed that options for replacing the A-10 be studied further.

Ground Support Missions

The Air Force is concerned about the adequacy of the A-7 and A-10 aircraft to perform the air-to-ground missions required to support ground operations in the 1990s and beyond. The threat of most concern to U.S. forces is a Warsaw Pact or Soviet invasion in central Europe. A key U.S. strategy to counter this threat is to provide close air support (CAS) to friendly troops near enemy forces and battlefield air interdiction (BAI) against reinforcements to the main battle area so that the enemy will lose momentum and eventually retreat or surrender. The distinction between CAS and BAI missions relates primarily to the nearness of the mission to friendly ground forces and the extent of coordination and integration with the Army.

CAS missions provide aerial firepower against enemy forces in close proximity to friendly ground forces. This action is directed against a variety of targets identified by the ground forces. Determining the targets and identifying their location requires detailed coordination and integration with Army forces.

The BAI mission is related to the CAS mission because it requires the air attack of enemy follow-on forces that have a near-term effect on (but not direct contact with) friendly ground forces. BAI requires Air Force

coordination with ground forces during planning and may require coordination during execution, but operations are performed at such distances from friendly forces that detailed integration of specific actions is not required. BAI, a subset of the air interdiction mission, has the objectives of delaying, disrupting, diverting, or destroying the enemy's military potential before it can be used against friendly forces. Because the air interdiction mission occurs much further from the troops than the BAI mission, it requires even less integration with land forces. For example, deep strikes against enemy command and control centers and airfields are air interdiction missions.

Status and Mission of the A-7

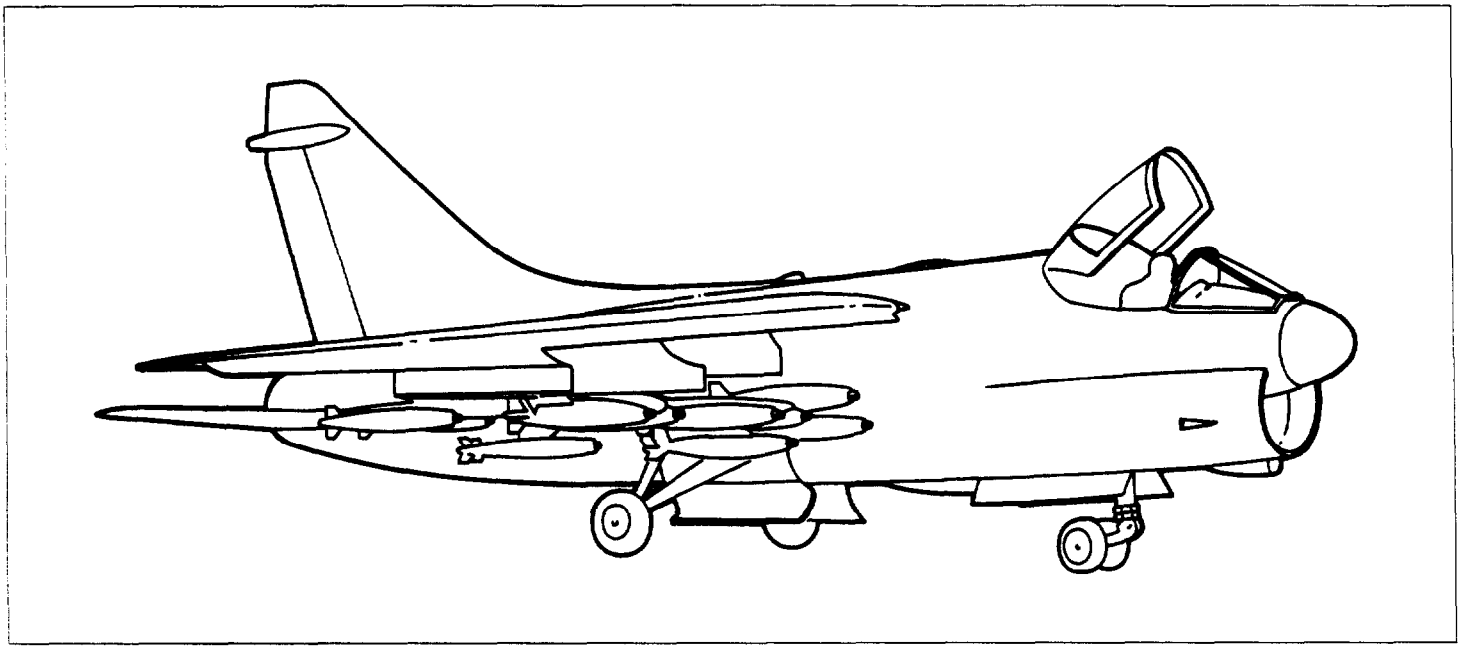
The Air Force's A-7 is a single-engine attack aircraft designed to carry a large amount of munitions long distances for use in ground attack missions. (See fig. 1.1.) The Air Force began accepting delivery of the aircraft from the LTV Corporation in 1968, flew them on air interdiction and close air support missions in Vietnam, and eventually purchased 459 single-seat combat aircraft and 31 two-seat trainers at an average cost of about $7 million each.

As of June 1988, there were 372 A-7s in the inventory: 343 in 14 Air National Guard units (315 combat and 28 trainers) and 29 at two active Air Force locations (Nellis and Edwards Air Force Bases). The Air Force plans to upgrade approximately 337 aircraft.

The A-7 has a planned service life of 20 years, and the current average age of the A-7 combat fleet is approximately 15 years. Each aircraft in the fleet has an estimated flying life of 14,000 hours. However, by 1990 the Air Force expects that the aircraft will have accumulated an average of 3,400 flying hours. The Air Force had planned to replace the A-7s with F-16s, but it currently plans to upgrade the A-7s beginning in the early 1990s when the combat fleet's average age will be approaching the 20 years.

According to mission statements, training requirements, and wartime tasking, the A-7's priority mission is air interdiction, which includes BAI. The statements recognize CAS as a second priority mission, and approximately one-tenth of the Air National Guard's training flights are required to be CAS. According to the Air Force, the aircraft will continue to be used for air interdiction but primarily in a BAI role. A recent statement of expected wartime mission apportionment for the 1990s projected that 70 percent of the A-7's missions will be BAI missions and 30 percent will be CAS missions.

Figure 1.1: A-7 Combat Aircraft



Air Force Evaluations of CAS and BAI Aircraft Alternatives

The Air Force considered new aircraft and improvements to existing aircraft in its evaluations of alternatives for performing air missions in direct support of ground forces in the 1990s and beyond. Two major Air Force efforts preceded its recommendation to upgrade the A-7: the Close Air Support Investigation initiated in 1984 and a 1985 Close Air Support Request for Information sent to industry.

The Close Air Support Investigation focused on identifying deficiencies of Air Force aircraft in performing CAS missions between 1995 and 2000 and exploring potential solutions with emphasis on new aircraft. The investigation concluded the A-10 was deficient and did not meet the mission's requirement for a moderately low detectable, fast, maneuverable, and sophisticated aircraft with new CAS weapons.

The 1985 Request for Information asked 13 major firms to provide information on existing aircraft that could be modified to perform CAS and BAI missions and be available for production beginning in the late 1980s. Four aircraft manufacturers responded and proposed the following aircraft:

- LTV, a modernized A-7 called the "A-7 PLUS;"
- General Dynamics Corporation, the F-16C;
- Northrop Corporation, the F-20; and
- McDonnell Aircraft Company, the AV-8B.

The Air Force's Aeronautical Systems Division analyzed the proposals and reported that all aircraft were technically viable candidates and that it was difficult to eliminate any on the basis of performance because mission requirements were not clearly defined.

The Air Force's Tactical Air Command (TAC) decided that the LTV A-7 PLUS proposal met operational needs, improved the A-7's reliability and maintainability, and was affordable. In addition, it concluded that the A-7 candidate had the capability to carry more munitions further than any of the other candidates. TAC later provided LTV with additional guidance; specifically, the upgrade should cost about $6.2 million (1984 dollars) and the first aircraft should be delivered in 1991. In response, LTV proposed the A-7 PLUS at a flyaway cost[1] of about $6.3 million per aircraft and an initial delivery date of 1991. Its proposal included replacing the engine, stretching the fuselage, and upgrading the avionics.

As part of LTV's response to the Request for Information, it recommended that 95 of the Navy's A-7s, which were being retired, be upgraded to A-7 PLUS for about $7 million each (1984 dollars). According to LTV and Air Force officials, LTV proposed that the Navy's A-7s be upgraded first and substituted for Air National Guard A-7s so that the impact on Guard units would be minimized. The Air Force rejected this recommendation because of the additional cost involved in upgrading the Navy version and concern about the remaining structural life of the Navy's aircraft. For example, by 1990 the Navy's A-7s will have an average useful life of about 3,900 hours remaining whereas the Air Force's A-7s will have about 10,600 hours remaining.

The Air Force considered the A-7 upgrade beneficial for several reasons, including the following.

- The improvements would enhance the A-7's CAS and BAI capabilities.
- The upgrade would sustain the A-7 portion of the CAS force an additional 20 years.

[1]Unit flyaway costs include engineering, tooling, labor, material, quality control, propulsion, avionics, armament, and engineering change order costs.

- The upgrade could be done at about half the cost of replacing the aircraft with F-16s.

As of April 1988, TAC and the Air Force Logistics Command estimated the total cost of upgrading the A-7 at about $4.7 billion or $14.2 million[2] each (then-year dollars[3]).

CAS and BAI Mission Requirements

The Army's AirLand Battle doctrine recognizes a need for tactical air support across the entire spectrum of the battlefield. In a 1985 memorandum of agreement, the Army and the Air Force agreed that CAS needs to be effective

"...on the non-linear battlefield across a broad spectrum of combat scenarios and threats ranging from the friendly rear area to the traditional main battle area and the deep maneuver arena."

Air Force officials noted that aircraft capable of performing future CAS missions would have characteristics of air interdiction aircraft. The Air Force believes these characteristics would include high subsonic speed and maneuverability, which allow the aircraft to avoid air defense threats.

Congressional Concern

The National Defense Authorization Act for Fiscal Years 1988 and 1989, Public Law 100-180, requires the Secretary of Defense to submit to the Senate and House Committees on Armed Services a report containing a master plan for meeting the Secretary's requirements for CAS and BAI. The report is to specify the requirements with respect to equipment, costs, schedule, and acquisition strategy and the roles for active and reserve forces in each of the military services. The House Committee on Armed Services stated in its report on the National Defense Authorization Act for Fiscal Year 1989 that it intends to monitor the upgrade of the A-7 aircraft and expects the master plan to take this upgrade into account.

Public Law 100-180 also specifies that no more than $10 million of funds appropriated or otherwise made available for fiscal year 1988 may be

[2]According to the A-7 program manager, the increase from $6.2 million to $14.2 million per aircraft is due to inflation, a longer production schedule, and the inclusion of non-recurring costs such as avionics development, preproduction engineering, and tooling required by the contractor.

[3]Then-year dollars measure the cost of goods and services in terms of prices current at the time of purchase.

obligated for the A-7 PLUS program until the Secretary of Defense certifies that the A-7 PLUS aircraft is the most cost-effective alternative for modernizing existing Department of Defense CAS and BAI assets and contributes to meeting the Secretary's requirements.

Objectives, Scope, and Methodology

In April 1987 the Chairman, House Committee on Armed Services, requested that we evaluate the CAS mission requirements and the Air Force's plans for meeting those requirements. In subsequent meetings with Committee representatives, we agreed to identify the Army's requirements and review Air Force plans to replace the A-10 and upgrade the A-7. This report addresses the A-7 upgrade program; a separate report addresses the CAS and BAI mission requirements and plans to replace the A-10. We discuss these efforts in separate reports because the issues associated with each are sufficiently different and significant.

To achieve our review objectives, we reviewed the Air Force's plans for upgrading the A-7 including the status of the A-7 upgrade proposal; the Air Force's justification; and the costs, schedule, and budget requirements. We also interviewed officials and obtained data at the following locations:

- Headquarters, United States Air Force, Washington, D.C., for data regarding the need for an upgraded A-7 and development schedule and costs;
- Tactical Air Command, Langley Air Force Base, Virginia, for requirements information and the status of Air Force budgetary considerations;
- Oklahoma City Air Logistics Center, Tinker Air Force Base, Oklahoma, for information on production schedule and costs;
- Aeronautical Systems Division, Wright-Patterson Air Force Base, Ohio, for information on prototype development schedule and costs;
- National Guard Bureau, Washington, D.C., for requirements, training, and mission information;
- Air Force Reserve/Air National Guard Test Center, Tucson, Arizona, for information on performance projections for the aircraft;
- LTV Corporation, Dallas, Texas, for information on performance projections and costs;
- United States Army Training and Doctrine Command, Fort Monroe, Virginia, for information on Army needs for air-to-ground support; and
- Office of the Secretary of Defense, Washington, D.C., for information on expected capability of the aircraft.

We also obtained information on past experience with the A-7 and expected performance and mission effectiveness of the proposed upgraded A-7 at Headquarters, United States Air Forces in Europe, Ramstein Air Force Base, West Germany; 185th Tactical Fighter Group, Iowa Air National Guard, Sergeant Bluff, Iowa; 140th Tactical Fighter Wing, Colorado Air National Guard, Aurora, Colorado; and 162nd Tactical Fighter Group, Arizona Air National Guard, Tucson, Arizona.

Our work was conducted in accordance with generally accepted government audit standards. The Department of Defense provided oral comments on a draft of this report. These comments have been included in the report as appropriate.

Mission Effectiveness of the A-7 PLUS Needs to Be Determined

According to the Air Force, the current A-7 has insufficient thrust to maintain the speed and maneuverability needed to survive in the CAS and BAI environment of the 1990s. The A-7 upgrade program is intended to enhance the A-7's performance, in terms of speed and maneuverability and avionics capabilities, to meet the expected threat into the 21st century. The upgrade includes replacing the engine, modifying the airframe, and using off-the-shelf avionics to accomplish the objectives of the A-7 upgrade program. The Air Force had not simulated the aircraft's estimated performance with these enhancements against the latest scenarios, related mission requirements, and threat because this information was not available when the Air Force chose the A-7 PLUS as the upgrade for the A-7. We believe that such evaluations are needed to establish the A-7 PLUS' operational requirements and determine its mission effectiveness.

A-7 PLUS' Operational Requirements Not Yet Defined

In the 1985 Request for Information, the Air Force expressed a need to improve its ability to perform CAS and BAI missions in the future. Subsequently, changing Army requirements and proposals by LTV to upgrade the existing A-7 became the bases for the Statement of Operational Need for the A-7 PLUS. In this statement, the Air Force attributes the A-7's mission deficiencies to aging avionics and performance limitations, specifically insufficient speed and maneuverability due to limited thrust. The solutions include adding a modern, highly reliable, engine to increase thrust; improving, replacing, or adding avionics components to ensure a highly reliable and maintainable aircraft compatible with the projected threat; and replacing high failure items with more reliable ones to improve the aircraft's mission availability.

The purpose of the prototype is to evaluate the engineering feasibility of aircraft changes. The performance criterion LTV must meet for the prototype is that the upgrade will not degrade the existing performance of the A-7. According to TAC officials, TAC has not identified specific operational performance requirements that the A-7 PLUS must meet. However, according to LTV's engineering estimates, the A-7 PLUS' increased thrust will provide greater speed, better takeoff and landing performance, better acceleration, smaller turning radius, and better capability to sustain speed in a turn.

A-7 PLUS' Mission Effectiveness Needs to Be Determined

The Air Force has simulated the A-7 PLUS' anticipated performance and compared it to the performance of the A-7 and other aircraft to indicate its effectiveness in CAS and BAI missions. However, it has not evaluated the aircraft's effectiveness in the CAS and BAI missions of the 1990s as currently defined by the Air Force.

Assessments of Mission Effectiveness

The Air Force conducted two studies to assess the A-7 PLUS' mission effectiveness compared to the mission effectiveness of other aircraft. Both studies evaluated the aircraft' performances in the high-threat environment of Europe and indicated the A-7 PLUS was as capable and, in some cases, more capable than the other aircraft. In 1986 TAC evaluated the CAS and BAI mission capability of the A-7 PLUS, the F-16C, and the A-10 aircraft to identify their combat radii and target kill potential. In 1987 a study by the Air Force Center for Studies and Analyses evaluated the mission effectiveness of the A-7 PLUS, the A-7, the A-10, the A-10 with new engines, the F-16, and a modified F-16.

Mission Requirements for the 1990s

In April 1987 the Army provided the Air Force with statements of tactical air support requirements for the 1990s. The requirements are related to specific battlefield characteristics and are the most detailed requirements developed to date. They are part of the Air Force's mission requirements package approved by the Department of Defense in December 1987 and provided to aircraft manufacturers for their use in developing the replacement aircraft to the A-10. The Air Force wants the A-10 replacement to be capable of performing the CAS and BAI missions of the 1990s and beyond.

The mission requirements package is a comprehensive database of aircraft design, mission requirements, and operational capabilities. It specifies three scenarios and nine operational missions in high- and low-threat environments against which the manufacturers' proposals will be evaluated. According to the Office of the Secretary of Defense, the Department of Defense plans to use the results of the evaluations to determine whether a new aircraft is more cost effective and survivable than a derivative of an existing aircraft.

TAC officials said these mission requirements could be used in evaluating the effectiveness of the A-7 PLUS; however, TAC had not done so because it did not (1) have the new mission requirements when it decided on the aircraft, (2) have the resources to conduct the evaluation, and (3)

believe that the evaluation was needed, since the aircraft would probably meet most requirements.

Concern Over the A-7 PLUS' Vulnerability

Air Force contracted studies show the A-7 is more vulnerable than the A-10. Concerns over the A-7 PLUS' vulnerability prompted the Congress to require the Secretary of Defense to certify by October 1988 that the A-7 PLUS meets the Secretary's vulnerability requirements. LTV is performing an assessment of the aircraft's vulnerability as part of the prototype effort. Preliminary results of the assessment show the A-7 PLUS prototype has more vulnerable area than the A-7 because stretching the fuselage increases the aircraft's vulnerable surface area. However, LTV estimates that with additional design changes, the A-7 PLUS could have less vulnerable area than the A-7 but still more than that of the A-10. According to officials with the Office of the Secretary of Defense, LTV's assessment will contribute to the information being developed for the Secretary of Defense's certification.

Conclusions

Air Force assessments indicate that the A-7 PLUS will perform as good or better than other aircraft. However, the extent to which the A-7 PLUS' enhanced performance will enable it to effectively perform the CAS and BAI missions of the 1990s and beyond, as currently defined, has not been evaluated. This evaluation should be performed using the mission requirements package developed for the A-10 replacement study, since the A-7 PLUS also must meet the CAS and BAI mission requirements of the 1990s. This evaluation is needed to establish the A-7 PLUS' operational capabilities and determine its mission effectiveness.

Recommendation

We recommend that the Secretary of the Air Force evaluate the A-7 PLUS' mission effectiveness against the mission requirements package developed for the A-10 replacement study. The results of the evaluation could be used in assessing the aircraft's cost effectiveness in performing the CAS and BAI missions, as required by Public Law 100-180.

Agency Comments

In its comments on our report, the Department of Defense stated that the Air Force Systems Command is evaluating the A-7 PLUS' mission effectiveness against the mission requirements package and that this evaluation is expected to be completed by December 31, 1988.

The Department stated that although the Office of the Secretary of Defense believes the A-7 improvements would enhance the aircraft's close air support and battlefield air interdiction capabilities in terms of system performance, it also believes that the A-7's survivability is questionable. The Department also stated that A-7 PLUS production would have to be approved by the Secretary of Defense.

Costs, Schedule, and Budgetary Requirements Are Uncertain

The current A-7 PLUS cost estimate of $4.7 billion (then-year dollars) does not include prototyping costs. Prototyping of structural and engine changes to the A-7 was undertaken in order to minimize risk. The Air Force estimates the cost of the prototyping to be $178 million. On the basis of these estimates, the total cost to improve the A-7 would be about $4.9 billion, or $14.6 million,[4] per aircraft. However, decisions concerning avionics and engine options and aircraft modifications beyond those programmed could affect the total cost. For example, according to Air Force officials, the cost impact of possible design changes to reduce the A-7 PLUS' vulnerability has not been determined.

The Air Force's current plans call for the first A-7 PLUS to be available in 1991, but, according to Air Force officials, that milestone could slip to 1993 due to limited production funding. In addition, budgetary requirements are uncertain.

Cost Uncertain

The total cost of the A-7 PLUS is not known because

- decisions about the aircraft's avionics equipment have not been made;
- a decision about which engine will be used in the aircraft has not been made; and
- studies are being conducted that could identify additional modifications not included in the current cost figures.

In 1985 LTV proposed that the Air Force upgrade the A-7 at an estimated cost of $6.8 million (1984 dollars) per aircraft. According to an LTV official, LTV subsequently reduced the capability of its proposed aircraft to stay close to a $6.2 million unit cost goal established by TAC. According to Air Logistics Center officials, the Air Force may have to make additional cost or capability trade-offs.

Avionics Choices

Even though the Air Force has described the A-7 PLUS' avionics upgrades in general terms, the decision on specific avionics equipment for the aircraft has not been made. That decision will affect the final cost of the A-7 PLUS and its capabilities. For example, according to LTV officials, the options under consideration for the forward looking infrared sensor include the Low Altitude Night Attack system, which costs approximately $800,000 each, and Pathfinder, which costs about

[4]This figure includes nonrecurring costs such as avionics development, preproduction engineering, and tooling.

$400,000 each. The Low Altitude Night Attack system makes it possible for an aircraft to perform low-altitude navigation during day or night and has a 6 to 1 magnification potential for target detection. According to the same officials, Pathfinder has a 2 to 1 magnification for day or night low-altitude navigation and has minimal target detection capability.

According to TAC and LTV officials, as of May 1988 LTV was preparing a study for the Air Force of the various avionics options and their costs. TAC officials said this study will provide the basis for TAC's choice of avionics for the A-7 PLUS. The decision on specific avionics for the aircraft was originally scheduled for February 1988.

Engine Choice

Two different engines have been proposed for the A-7 PLUS—the General Electric F-110-GE-100 and the Pratt & Whitney F-100-PW-220. Although the prototypes will use the Pratt & Whitney engine, the Air Force is expected to decide at a later date which one will be used for production. A cost of $3 million each was included in the Air Force's estimate for the engine. The Air Logistics Center's cost estimates are $3 million for the Pratt & Whitney engine and $3.2 million for the General Electric engine. On the basis of these estimates, a decision to use the General Electric engine would add $67 million to the total cost of modifying the A-7s.

Ongoing Studies

According to National Guard Bureau officials, the bureau is funding LTV studies that will be used in evaluating the need for some aircraft modifications not included in the A-7 PLUS program. Two such studies are on radar improvements and aircraft rewiring.

National Guard Bureau officials told us that they consider the A-7's radar unreliable and inadequate for mission performance. One LTV study is evaluating alternatives to the current A-7 radar. According to a TAC official, the radar is considered adequate for initial fielding of the aircraft; however, the Air Force will consider an upgrade or replacement in future aircraft modifications.

According to National Guard Bureau officials, the A-7 PLUS program includes replacing 60 to 80 percent of the wiring in the A-7. They indicated that, depending on the condition of the remaining wiring, it may be appropriate to rewire the remainder of the aircraft at the time of the

A-7 upgrade to ensure its adequacy over the extended life of the aircraft. The purpose of this LTV study is to provide information that will be used to make a decision on rewiring. LTV estimates the cost of the additional rewiring to be about $360,000 per aircraft, but this could be reduced to about $175,000 if done at the time of the A-7 upgrade.

In addition, according to Air Force officials, the cost impact of LTV's assessment of possible design changes to reduce the aircraft's vulnerability has not been determined.

Schedule Is Uncertain

Since the Air Force's goal is to have the first A-7 PLUS delivered in 1991, TAC established the program milestones shown in table 3.1.

Table 3.1: Planned Program Milestones

Milestone	Date
Prototype flight testing	
Start	May 1989
End	April 1990
Avionics integration	
Final decision on avionics options	February 1988
Contract award	September 1988
Production decisions	
For first 6 aircraft	September 1988
For next 94 aircraft	September 1989
First aircraft delivery	June 1991

According to Air Force officials, meeting the 1991 delivery date for the first aircraft is virtually impossible because of delays in production funding. For example, unless the Secretary of Defense makes certain certifications about the aircraft's cost effectiveness and vulnerability, no more than $10 million of fiscal year 1988 funds may be obligated for the A-7 PLUS program.

As shown in table 3.1, the planned production schedule has some inherent risk because the Air Force's decision to produce the first 6 aircraft is scheduled to be made 8 months before the beginning of flight testing of the prototypes. In addition, only 4 of 11 months of the planned flight testing would be completed before the decision to produce the next 94 aircraft. The proposed schedule being considered within the Air Force would eliminate this risk by delaying the initial production decision until

flight testing is completed. It would also delay delivery of the first aircraft until May 1993.

Budgetary Requirements Are Uncertain

The Air Force has established funding requirements for the prototyping effort, but, because of uncertainties concerning the final A-7 PLUS configuration and schedule, total funding requirements are uncertain.

Prototype Funding

The Air Force estimates that prototyping will cost $178 million. Through fiscal year 1988, about $75.9 million has been approved for this effort. The Air Force budgeted $73.7 in fiscal year 1989, $24.3 in fiscal year 1990, and $4.1 in fiscal year 1991. Funds for this effort are requested as part of the Research, Development, Test, & Evaluation appropriation.

Production Funding

The National Defense Authorization Act for Fiscal Years 1988 and 1989 provided that no more than $10 million of fiscal year 1988 funds may be obligated for the A-7 PLUS program until the Secretary of Defense makes certain certifications to the Congress in writing concerning the program. These funds are being used for production planning and, according to Air Force officials, are the only production funds approved and requested by the Air Force for the A-7 PLUS through fiscal year 1994. Air Force Logistics Center officials estimated that $40 million will be needed in fiscal year 1990 to meet the proposed 1993 delivery date for the first aircraft. The Air Force is considering funding options to support A-7 PLUS production between 1990 and 1994, including a reduction in the number of F-16s purchased.

Conclusions

The Secretary of Defense must certify to the Congress that the A-7 PLUS is the most cost-effective alternative for modernizing existing Department of Defense CAS and BAI assets. However, the Air Force needs to make some critical decisions affecting cost and schedule. Once these decisions are made and the costs are determined, the evaluation of the aircraft against the mission requirements package, as recommended in chapter 2, may help the Air Force clarify the overall cost effectiveness of the A-7 PLUS and enable the Secretary of Defense to make the required certification.

Agency Comments

The Department of Defense said that it did not agree with the our position that the total cost of the A-7 PLUS is unknown. It stated that the Air Force knows what avionics subsystems are required to be modified, replaced, or added to the aircraft. It also stated that radar improvements and aircraft rewiring are not part of the A-7 PLUS program and, if done, would be considered aircraft modifications even if performed at the same time as the A-7 upgrade.

Despite the Department's comments, we continue to believe that the A-7 PLUS' total cost is unknown. According to the A-7 PLUS program manager, as of July 1988 the Air Force had not decided on specific avionic equipment for the A-7 PLUS. Moreover, we believe that major improvements, such a rewiring, that are needed to extend the aircraft's service life should be considered part of the cost of the A-7 PLUS.

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