

GAO

United States General Accounting Office
Report to the Chairman, Committee on
Armed Services, House of
Representatives

September 1990

**STRATEGIC
MISSILES**

**Logistics Support for
Advanced Cruise
Missile Based on
Outdated Plans**



142195





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

**National Security and
International Affairs Division**

B-240467

September 13, 1990

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

Dear Mr. Chairman:

This report was prepared in response to your request that we review the Advanced Cruise Missile program. The report addresses the need for logistics support to be based upon current program plans and recommends that the Air Force develop additional guidance for updating such plans.

We are sending copies of this report to the Chairmen, Senate Committee on Armed Services, and Subcommittees on Defense, House and Senate Committees on Appropriations; the Secretaries of Defense and the Air Force; the Director, Office of Management and Budget; and other interested parties.

Please contact me at (202) 275-4268 if you or your staff have any questions concerning this report. The major contributors to this report are listed in appendix II.

Sincerely yours,

A handwritten signature in cursive script that reads "Nancy R. Kingsbury".

Nancy R. Kingsbury
Director
Air Force Issues

Executive Summary

Purpose

Over the next 5 years, the Air Force plans to deploy 1,461 Advanced Cruise Missiles. Logistics support is expected to cost \$1.7 billion. To be cost-effective, the required logistics support must be available at the right time, not too early and not too late.

At the request of the Chairman, House Committee on Armed Services, GAO reviewed the Air Force's management of the Advanced Cruise Missile program. In this report on logistics support management, GAO's primary objectives were to determine (1) if logistics support was being provided effectively and in accordance with program plans and (2) whether program problems existed that could increase logistics support costs.

Background

The Advanced Cruise Missile is a subsonic, turbofan-powered missile that will carry a nuclear warhead. The missile is to be carried by B-52H and B-1B bombers. After a missile is released from the bomber, the missile's engine ignites and its avionics equipment guides it to the target. The missile is to enhance the long-term effectiveness of the bomber leg of the strategic triad, and it is to have a capability of defeating projected Soviet defenses through the 1990s and beyond. The missile uses stealth (low observable) technologies to penetrate and evade enemy defenses and has greater range and accuracy than the existing Air Launched Cruise Missile. It is also to have increased operational roles and improved chances of reaching its target.

Logistics support includes facilities and equipment for servicing the missile, trained maintenance personnel and flight crews, and adequate supplies of parts. This support is provided based on program plans that specify the number of missiles to be bought and the planned delivery schedule.

Results in Brief

The Air Force did not revise Advance Cruise Missile logistics plans when major program changes occurred. Setbacks in the missile's development and production resulted in significant program restructuring. Although the Air Force updated its program plans, it did not have procedures to implement these changes effectively for functional areas such as logistics and facilities. As a result, the Air Force expended resources prematurely to acquire spares, maintenance and repair capability, and facilities.

Logistics and support costs could increase because of marginal system reliability and design and quality problems such as fuel leaks and accessibility to subsystems. Air Force managers are working to overcome these problems.

The Air Force has identified potential reductions in the number of missiles to be bought. Depending on the number, logistics and support cost savings of between \$74 million and \$991 million are possible if logistics plans are promptly updated.

Principal Findings

Logistics Support Based on Outdated Program Plans

The initial program plans provided for the first operational missile to be delivered in late 1986. Test failures, production problems, and other program changes resulted in slippage of the first operational missile delivery until 1990. However, the Air Force continued to provide logistics support using original delivery schedules because logistics program plans were not officially changed. The Air Force did not change logistics plans until after the Congress eliminated production funds for fiscal year 1989. Even after the Congress eliminated production funds, over 1 year passed before the Air Force changed the logistics program plans.

Because logistics support was provided based on outdated data (1) spares were purchased too early, and limited quantities are becoming unusable as design changes are made and (2) about \$30 million was spent for Advance Cruise Missile facilities at an Air Force base that was deleted from basing plans for the missile. In addition, the Air Force paid \$7.2 million for contractor repair services through 1989, even though no operational missiles were repaired. Furthermore, Air Force personnel trained to work on the missiles at K.I. Sawyer Air Force Base were reassigned or separated before working on an operational missile, which was delivered about 3-1/2 years later than originally planned.

Guidance Needed for Revising Logistics Plans

In response to congressional and Department of Defense (DOD) initiatives for improving the defense acquisition process, the Air Force circulated a draft regulation in March 1989, which provides that program plans are to be updated annually or sooner if significant changes occur. System program office and logistics managers said that the logistics program plans had not been changed because the March 1989 draft regulation did

not provide specific guidance on when and how to change the plans. Officials at Air Force headquarters confirmed that guidance to update program plans did not exist for functional areas such as logistics and facilities construction for either the Advance Cruise Missile or other programs. These officials said they planned to establish policy for functional areas in Air Force Regulation 800-3 and procedures in Air Force Pamphlet 800-4; however, those two documents have not been developed.

Operational Maintainability May Be Difficult and Costly

According to Air Force estimates for a program of 1,461 missiles, initial logistics costs will be \$424 million and follow-on costs will total \$1.3 billion from 1990 through 2009. These estimates are based on achieving projected system reliability levels.

The Advance Cruise Missile has marginal system reliability and design and quality problems, such as fuel leaks and limited accessibility to subsystems. In addition, logistics planners are faced with supporting a system with nine different configurations. Unless these problems are resolved, maintaining the missile in the field will be difficult and will cost more than the Air Force estimates.

Initiatives are underway to reduce the number of different configurations, ensure that sufficient quantities of spares are available, and improve reliability and quality. For example, the Air Force plans to spend \$70 million over the next 3 years to identify and resolve design problems. These initiatives, although costly, are intended to avoid future increases in logistics support costs.

Program Options Provide Opportunities to Reduce Costs

The Air Force has identified several options for reducing the number of missiles to be bought. In September 1989, for example, Strategic Air Command officials advised GAO that the number of missiles could be reduced from 1,461 to 1,200 because of revisions made to force structure plans. If the need for fewer missiles were reflected in logistics program plans, spare parts purchases, equipment, and other logistics support could be reduced about \$74 million.

Another option considered in 1989 provided for reducing the total number of missiles to 510. This would enable the Air Force to operate at two bases rather than four and to reduce personnel, support equipment, aircraft modifications, and spares costs by \$991 million.

Recommendation

GAO recommends that the Secretary of the Air Force ensure that logistics support is based upon current data by developing procedures for revising logistics plans.

Agency Comments

In its comments on a draft of this report, DOD generally agreed with GAO's findings. DOD agreed that logistics support should be based on current data and modified when program direction is changed. DOD did not agree, however, that a new set of procedures was needed because existing guidance included adequate instruction. GAO believes that the experience with the logistics support for the Advance Cruise Missile program indicates that additional guidance is necessary to ensure that plans and expenditures for logistics support are consistent with current program plans.

Contents

Executive Summary		2
Chapter 1		8
Introduction	Program History	8
	Significance of Logistics	10
	Objectives, Scope, and Methodology	11
Chapter 2		12
Logistics Support Based on Outdated Program Plans	Not Updating Program Plans Results in Premature Expenditures	12
	Procedures Needed to Avoid Unnecessary and Premature Expenditures	17
	Program Changes Provide Opportunities to Reduce Costs	18
	Conclusions	20
	Recommendation	20
	Agency Comments and Our Evaluation	21
Chapter 3		22
Operational Maintainability and Supportability May Be Difficult and Costly	Logistics Cost Estimates	22
	Reliability, Design, and Quality Problems Could Increase Costs	23
	Conclusion	26
	Agency Comments	26
Appendixes	Appendix I: Comments From the Department of Defense	28
	Appendix II: Major Contributors to This Report	36
Tables	Table 1.1: Acquisition Milestones	9
	Table 2.1: Procurement Schedule Changes	12
	Table 2.2: Purchases of Spares From November 1988 Through September 1989	13
	Table 2.3: Spares That Must Be Modified	14
	Table 2.4: K.I. Sawyer Personnel That Received Advanced Cruise Missile Training	16
	Table 2.5: Potential Logistics Cost Reductions	19
	Table 3.1: Initial Logistics Support Costs	22
	Table 3.2: Cost to Maintain the Advanced Cruise Missile	22

Abbreviations

AFLC	Air Force Logistics Command
ALC	Air Logistics Center
DOD	Department of Defense
GAO	General Accounting Office

Introduction

The Air Force is developing the Advanced Cruise Missile to enhance the long-term effectiveness of the bomber leg of the strategic triad and to have a capability of defeating projected Soviet defenses through the 1990s and beyond. Compared to the existing Air Launched Cruise Missile, the Advanced Cruise Missile is to have greater accuracy and range, allowing launch at extended distances from enemy borders. By using stealth (low observable) technologies to penetrate and evade enemy defenses, the Advanced Cruise Missile will have increased operational roles and improved chances of reaching its target.

The Advanced Cruise Missile is a subsonic, turbofan-powered missile that will carry a nuclear warhead. As of May 1990, the Air Force planned to buy 1,461 Advanced Cruise Missiles, and total program acquisition cost was estimated at \$7 billion.

General Dynamics, Convair Division, is the prime contractor for the Advanced Cruise Missile program. General Dynamics is responsible for full-scale development, which includes designing and producing the missiles, conducting system test flights, planning and integrating all logistics tasks, identifying training requirements, and providing interim contractor support until the Air Force can provide system maintenance.

Program History

The Advanced Cruise Missile began in 1982 as a highly classified program. The development contract was awarded in April 1983 to General Dynamics. The Department of Defense's (DOD) policy on major weapon system acquisition stresses the importance of minimizing the time to develop, produce, and deploy major systems for use by operational forces. On the basis of this policy, the perceived need for the missile, and an assessment as to risk, the Air Force decided to develop and produce the missile concurrently.¹

The Air Force plans to locate the Advanced Cruise Missiles at four Strategic Air Command bases. K.I. Sawyer Air Force Base, Michigan, has been designated as the initial main operating base.

Since 1985, the Air Force has awarded four production contracts totaling 360 missiles to General Dynamics. The Air Force also has authorized long lead material and funding for a fifth lot of 100 missiles

¹Concurrency is defined as the overlap in time between the development of a weapon system and its production—production is started while development is still underway. In a nonconcurrent program, development is usually completed before production begins.

to be procured in fiscal year 1990. The missile's schedule slipped, and total program cost estimates increased significantly following development problems and unsuccessful test flights. Milestone dates have been revised from the original 1983 schedule, as shown in table 1.1.

Table 1.1: Acquisition Milestones

Milestone	Baseline	Actual	Change in months
Contract award	Apr. 1983	Apr. 1983	0
Critical design review	May 1984	Mar. 1985	10
Pilot production	June 1985	July 1985	1
Low-rate initial production decision	Oct. 1985	July 1986	9
Full-rate production decision	Mar. 1986	Nov. 1990 ^a	56
Delivery of first operational missile	Dec. 1986	June 1990	42

^aThis is an Air Force projected date.

In November 1987, because of numerous schedule delays and quality problems affecting the program, the Air Force chose McDonnell Douglas Missile System Company as a second production source. General Dynamics will remain as the design agent (i.e., responsible for managing and controlling design changes to the missile). The Air Force will buy missiles from both companies in fiscal years 1990 and 1991, but beginning in fiscal year 1992, the two companies will compete for missile production, with the total quantity split between the two.

The first missile—referred to as preoperational because it did not meet contract specifications—was delivered to K.I. Sawyer Air Force Base on June 14, 1988. A total of 25 preoperational missiles was delivered to this base for use in validating operating procedures, providing on-the-job training, conducting ground testing, and repairing missiles. According to the Air Force, the missiles will be returned to General Dynamics in 1990 to be reconfigured to the latest system design. Additional missiles are waiting to be reconfigured at General Dynamics.

In November 1988, the House and Senate Committees on Appropriations prohibited the expenditure of fiscal year 1989 Advanced Cruise Missile production funds until the contractor could demonstrate additional successful test flights. By this time, missile deliveries were about 32 months behind the original schedule. In September 1989, the Secretary of Defense notified the Congress that the congressional requirement for successful flight tests had been met.

Significance of Logistics

Logistical requirements include facilities and support equipment for servicing the missile; maintenance planning for contractor and Air Force repair of parts; personnel; data management systems; training and training support; computer resources support; packaging, handling, storage, and transportation; and adequate supplies of parts. Providing effective, efficient, and economical logistics support to a weapon system is of major concern to DOD because logistics, in addition to being costly, helps determine if a weapon system will be ready to perform its mission.

Since about 1980, DOD has placed increased emphasis on the importance of logistics by establishing policies and procedures to improve readiness and support. DOD policy states that the primary objectives of the acquisition process are improved readiness and sustainability and that resources needed to achieve readiness will receive the same emphasis as those required to achieve schedule and performance objectives while a system progresses through development, testing, production, and deployment.

Specific responsibility for logistics management exists within the program management structure. The Air Force Systems Command is the implementing command for the Advanced Cruise Missile program and within the Command, the Aeronautical Systems Division is the lead division. Program management responsibility is assigned to the Advanced Cruise Missile system program office located at Wright-Patterson Air Force Base, Ohio. Logistics support resource acquisition, planning, programming, budgeting, and allocation are the responsibility of the Deputy Program Manager for Logistics, the Air Force Logistics Command (AFLC) representative at the program office. The Oklahoma City Air Logistics Center (ALC) is the system program manager for AFLC. The Air Force Systems Command's Contract Management Division is responsible, through the resident Air Force Plant Representative Office, for production contract administration functions.

The Strategic Air Command, as the user command for the Advanced Cruise Missile, is an integral part of all program development. The Command continuously reevaluates the missile operational requirements that it developed. It is responsible for planning and providing the base level infrastructure needed for deploying the missile and for providing organizational level maintenance, which includes inspecting, servicing, and replacing parts. This type of maintenance will be done by the munitions maintenance squadron at the Air Force base and will be performed on the flight line or at the intermediate maintenance facility.

The principal facility for the missile depot maintenance is the Ogden ALC located at Hill Air Force Base, Utah. The Oklahoma City ALC, located at Tinker Air Force Base, Oklahoma, has the software and engine depot maintenance facilities. Depot level maintenance involves major repairs or a complete rebuild of parts, assemblies, subassemblies, and end items.

Objectives, Scope, and Methodology

The Chairman, House Committee on Armed Services, asked us to review the Advanced Cruise Missile program. In this portion of the work addressing logistics, we determined if (1) logistics support for the Advanced Cruise Missile was being provided effectively and in accordance with up-to-date program plans and (2) logistics support problems existed that could result in operational problems and higher support costs.

We interviewed Air Force officials and reviewed regulations, reports, and other documents about logistics support for the program. Documents included plans and cost projections for contractor and Air Force repair of parts, base and depot facilities, support equipment, maintenance training, and technical orders. We obtained spare parts requirements computations on the large dollar value line replaceable units to determine if the computations supported item management decisions and precluded unnecessary purchases. We also reviewed Air Force internal controls and inventoried selected Advanced Cruise Missile spare parts to determine if the Air Force had adequate controls for accounting and safeguarding spare parts.

We conducted our review at

- Headquarters, Department of the Air Force, Washington, D.C.;
- Headquarters, Strategic Air Command, Offutt Air Force Base, Nebraska;
- Advanced Cruise Missile System Program Office, Air Force Systems Command, Aeronautical Systems Division, Wright-Patterson Air Force Base, Ohio;
- Advanced Cruise Missile System Program Manager, Oklahoma City ALC, Tinker Air Force Base, Oklahoma; and
- K.I. Sawyer Air Force Base, Michigan.

We conducted our review between July 1989 and April 1990 in accordance with generally accepted government audit standards. DOD's comments on this report are included as appendix I.

Logistics Support Based on Outdated Program Plans

The Air Force has used outdated logistics program plans to provide logistics support for the Advanced Cruise Missile because it did not have adequate policies to ensure that logistics support was based on current data. As a result, spares were bought, operational training was initiated, and base construction occurred long before required. In some cases, these actions resulted in the premature expenditure of funds. In other cases, parts were bought that must be modified at an additional cost and facilities were constructed, which are not now required.

As the program proceeds into full production, logistics support will need to be based on up-to-date plans. The Strategic Air Command's current requirements for a lesser number of missiles have not been reflected in the program plans. Other options that have been considered would represent more significant cutbacks in the program and could preclude, if implemented in a timely manner, logistics expenditures of hundreds of millions of dollars. Procedures are needed to ensure that logistics support is being provided based upon current program plans.

Not Updating Program Plans Results in Premature Expenditures

The logistics program plan, prepared by the system program office, provides logistics planners with the number of missiles that are expected to be produced monthly. This plan is an important document since timely and accurate logistics planning is determined according to the prescribed missile production. The initial schedule, developed in 1983, provided that 1,461 missiles were to be produced and delivered to the Air Force by fiscal year 1990. However, delivery of the first operational missile did not occur until June 1990, and production and delivery are not to be completed until fiscal year 1995. Table 2.1 shows changes in the Advanced Cruise Missile procurement schedule since the Air Force's initial 1983 plan.

Table 2.1: Procurement Schedule Changes

Schedule as of	Number of missiles by fiscal year									Total
	1985	1986	1987	1988	1989	1990	1991	1992	Beyond 1992	
Oct. 1983	10	200	400	400	400	51	0	0	0	1,461
Oct. 1987	10	100	150	500	400	301	0	0	0	1,461
Oct. 1988	10	100	150	100	150	150	500	301	0	1,461
Oct. 1989	10	100	150	100	0	100	100	250	651	1,461

According to Air Force officials, program changes after the logistics program plan was prepared in 1986 contributed to logistics support uncertainties and caused problems in providing timely and accurate spares, repair services, and facilities. This program plan was based on the 1983 production schedule, even though the production schedule had slipped some by 1986. Despite numerous changes between 1986 and 1989, logistics planners continued to provide logistics support using the 1986 program schedule. The logistics plan was not revised until November 1989, about a year after the Congress eliminated fiscal year 1989 Advanced Cruise Missile production funds. As a result, resources were expended prematurely to acquire spares, maintenance and repair capability, and the facilities infrastructure.

Spares Purchased Early

Spare parts are bought according to when production missiles are to be delivered to the field. Because the Air Force used outdated program data, spares were purchased too early, and limited quantities are becoming unusable as system configuration changes are made. Table 2.2 shows that the Air Force spent about \$2 million for spare parts between November 1988 (when the House and Senate Appropriations Committees prohibited expenditure of fiscal year 1989 funds for missiles) and September 1989. These purchases were based on a 1986 program schedule that was not updated to reflect program slippages that occurred after 1986.

Table 2.2: Purchases of Spares From November 1988 Through September 1989

Quarter ending		Amount purchased
Year	Month	
1988	December	\$25,218
1989	March	111,341
	June	1,061,185
	September	761,007
Total		\$1,958,751

Slippages and reductions in the delivery schedule can affect spares buys. For example, the Air Force bought 17 sensors (Stock No. 1420-01-295-2649HD), which are used to monitor all software systems and provide input to the guidance set, at a cost of \$7,063,330. According to the Air Force's February 1988 initial provisioning requirement computation, delivery of these 17 spares would coincide with delivery of 838 missiles. These spares were to be delivered to the Air Force by 1991, but, due to program delays, the 838th missile is not planned to be delivered until

1994. Therefore, some of these spare sensors will be received 3 years before they are projected to be needed. In another example, the Air Force bought 27 spare guidance sets (Stock No. 1420-01-252-1122HD), which are used to navigate the missiles to the designated targets, at a total cost of \$6,374,700. According to the Air Force's February 1988 initial provisioning requirement computation, delivery of these 27 sets would coincide with delivery of 739 missiles. These spares were to be delivered to the Air Force in 1991, but, due to program delays, the 739th missile is not planned to be delivered until 1994. Therefore, some of these sets will be received 3 years before they are projected to be needed.

Because the Air Force is still uncertain when the contractor will be able to deliver operational missiles, the number and value of spares the Air Force has bought too early cannot be documented. However, Air Force officials agreed that spare parts were bought too early.

Purchasing parts earlier than necessary will increase inventory holding costs, lead to excessive inventories, and increase the probability of obsolescence, especially in concurrent programs. Obsolescence results in additional costs to modify parts or to replace parts that cannot be modified. For example, because of system design changes, three parts are now obsolete and must be modified to fit the newest missile configuration. The costs associated with modifying these three parts are shown in table 2.3.

Table 2.3: Spares That Must Be Modified

Part	Quantity	Total initial cost	Cost to modify
Aft avionics unit	2	\$81,290	\$99,000
Sensor	2	830,980	100,000
Guidance set	4	944,400	470,300
Total		\$1,856,670	\$669,300

In addition, design changes are expected to make two forward avionics units valued at \$99,000 and two umbilical assemblies valued at \$73,360 obsolete. These parts cannot be modified and may have to be thrown away.

Contractor Repair Services Purchased Early

Interim contractor support is intended to provide depot level repair during the period before Air Force depot capability is established. This type of support consists of establishing a management infrastructure at

the prime contractor and subcontractors; developing component repair plans at each source of repair; identifying, ordering, and storing necessary repair parts; developing systems/procedures to collect repair data; and repairing parts. Interim contractor support is applicable to all Advanced Cruise Missile system equipment, including support and test equipment.

According to Air Force officials, an accepted rule is that the initial development of an interim contractor support program begins 1 to 2 years before the delivery of the first operational missile to be supported to ensure the support structure exists when needed. For the Advanced Cruise Missile program, the Air Force procured an interim contractor support capability in fiscal year 1986 to support missile deliveries then scheduled for late fiscal year 1987. Since 1986, \$7.2 million has been spent for interim contractor support, although an operational missile was not delivered until June 1990. ALC officials said that when interim contractor support began, the flight test program was showing excellent progress and that this support was expected to be required to support anticipated missile deliveries. After the flight test program experienced a series of failures in 1988 and deliveries of operational missiles slipped, only minimum contractor services were needed and few repairs were required because operational missiles were not being supported.

Logistics managers told us that they had to expend resources to support the planned delivery schedules to comply with the contract and the logistics program plan. They said that following the program delays in 1988, they revised the interim contractor support contract to reduce costs. Air Force officials stated that funds spent on this support were not lost as the contract is now in place, repair parts are available, and preoperational missiles and support equipment are being repaired as failures occur. Similar benefits could have been achieved if support had been provided based on a revised logistics plan, and the costs could have been less than the \$7.2 million spent on interim contract support over the longer period.

**Base Construction and
Activation Occurred Early**

The Air Force did not adjust its military construction obligations and base activation plans when program delays and changes occurred. In addition to activating K.I. Sawyer Air Force Base as an Advanced Cruise Missile base when originally planned, the Air Force expended military

construction funds prematurely at another Air Force base.¹ The construction at the second base, which primarily involves missile storage and maintenance facilities, has proven to be unnecessary because it is no longer to be used as an Advanced Cruise Missile base. Because the construction program plan was not updated so that base construction could be rescheduled, the Air Force spent over \$30 million for military construction at a base where Advanced Cruise Missiles will not be deployed. According to DOD, the facilities remain an integral part of the strategic cruise missile force structure and, while initially planned for the Advanced Cruise Missile, they are being used without modification for the Air Launched Cruise Missile.

The first operational Advanced Cruise Missile was delivered in June 1990, about 3-1/2 years after the Air Force activated the first Advanced Cruise Missile base. One result of the early base activation was that Air Force personnel, after being trained and assigned to work on this missile program at K.I. Sawyer Air Force Base, either were reassigned or separated before the first missile delivery. Table 2.4 shows that 167 Air Force personnel stationed at K.I. Sawyer Air Force Base received Advanced Cruise Missile training from 1987 through 1989.

Table 2.4: K.I. Sawyer Personnel That Received Advanced Cruise Missile Training

Job description	Number received training
Missile system maintenance	43
Ground equipment mechanic	19
System handlers	33
System loaders	25
Release	18
Munitions maintenance specialist	19
Explosive ordnance disposal	10
Total	167

Air Force officials confirmed that trained personnel left for other duty stations or left the Air Force before working on an operational Advanced Cruise Missile but could not provide data on the number of such personnel. In addition, the Oklahoma City ALC placed one support person at K.I. Sawyer Air Force Base in July 1986, 6 months before the original scheduled delivery of the first missile. In early 1988, the ALC requested that this position be terminated and that the individual be returned to Oklahoma City. The system program office did not agree,

¹The identity of this base is classified.

and it told the ALC that the program would soon be back on schedule. The individual remained at this base until October 1988 when the ALC unilaterally withdrew the position.

Air Force officials said that because program slippages were resulting in less than optimum use of logistics resources, 25 preoperational missiles were delivered to K.I. Sawyer Air Force Base. According to Air Force officials, delivery of these missiles provided significant benefits in terms of maintenance preparation, training, testing, and technical order validation and verification. K.I. Sawyer officials were able to provide proficiency training to personnel, execute technical order validation and verification, identify over 700 potential changes to procedures, and submit over 200 service reports that identified shortcomings in contractor workmanship and difficulties encountered in moving and repairing the missiles. According to the Air Force, the delivered preoperational missiles also provided opportunities to do extensive electronic testing on the Advanced Cruise Missiles.

Procedures Needed to Avoid Unnecessary and Premature Expenditures

According to Air Force officials, they continued to acquire logistics support for the missiles according to original plans because they were optimistic that recovery initiatives would correct program problems. They said that because solutions were always thought to be forthcoming, logistics support planning was based upon official schedules and contracts that were outdated. More importantly, Air Force officials cited the lack of adequate DOD and Air Force policy covering the appropriate time to restructure logistics program plans as a major reason for continuing to use outdated program data. Without such a policy, Air Force officials believed they were compelled to provide logistics support in accordance with official program schedules, even though the schedules were outdated.

In response to congressional and DOD initiatives for improving the defense acquisition process, the Air Force established the Acquisition Executive System in 1988. The system is intended to enhance information flow and accountability by requiring top management involvement in acquiring major weapon systems. One element is the development of an acquisition program plan that establishes cost, schedule, and performance thresholds and is to serve as a contract among the program manager, the Program Executive Officer, the Air Force Acquisition Executive, and the Defense Acquisition Executive, reflecting agreements on key program parameters and the resources that shall be allocated to achieve the parameters.

In March 1989, the Air Force circulated a draft regulation requiring top level program plans to be updated annually or sooner if significant program changes occur. However, officials involved in the Advanced Cruise Missile program told us that they had not received adequate guidance on when or how to change logistics support plans. Officials at Air Force headquarters confirmed that procedures to implement changes in functional areas, such as logistics and facilities construction, had not been developed. The officials stated that they planned to establish policy for functional areas in Air Force Regulation 800-3 and procedures for functional areas in Air Force Pamphlet 800-4. However, these two documents have not been developed.

Program Changes Provide Opportunities to Reduce Costs

The Air Force's system program office plans to buy and logistically support 1,461 Advanced Cruise Missiles, even though the Strategic Air Command has reduced quantities required. The Strategic Air Command reduction is based on Air Force plans to modify fewer bombers to carry Advanced Cruise Missiles than when Advanced Cruise Missiles' procurement quantities were established. When the Air Force decided to buy 1,461 Advanced Cruise Missiles in 1983, force structure plans assumed B-52G and B-52H bombers would carry a mix of Air Launched Cruise Missiles and Advanced Cruise Missiles until the early 1990s. Then B-52Gs were to retire and their cruise missiles were to be transferred to B-1Bs. However, the Air Force changed these plans and only B-52H bombers are being modified to carry Advanced Cruise Missiles. Strategic Air Command officials advised us that when spare missiles are included, the Air Force's total procurement requirement is 1,200 Advanced Cruise Missiles.

The Air Force also has considered or is considering the following reductions.

- A total procurement quantity of 1,093 was proposed in fiscal year 1989. This quantity was later increased to 1,461 missiles without explanation by the Office of the Secretary of Defense.
- A total procurement quantity of 510 missiles was proposed based on (1) poor missile flight tests at that time and (2) the need for reduced spending in the 1990 through 1992 time frame. This option involved deploying the missiles at two bases rather than four. However, the Air Force decided to continue the program at 1,461 missiles.
- A total procurement quantity of 1,000 is being considered for fiscal year 1991 based primarily on budgetary decisions.

Reductions in quantities such as these would negate the need for some spares purchases, maintenance and repairs, and other support costs such as activating additional bases. On the basis of an estimated logistics and support cost of \$1,707 million and retrofit and pylon modification costs of \$108 million for 1,461 missiles, the Air Force could save between \$74 million and \$991 million with reduced quantities. (See table 2.5.) These savings would be dependent on logistics and support plans being closely tied to revised program plans.

Table 2.5: Potential Logistics Cost Reductions

Category	Estimated logistics support costs	
	1,200 missiles	510 missiles
	Initial spares ^a	\$85
Peculiar support equipment ^a	195	99
Common support equipment ^a	28	16
Retrofit cost ^a	26	12
Replenishment spares ^b	101	43
Depot level maintenance ^c	525	210
Base level maintenance ^c	50	20
Personnel cost ^c	336	134
Operations and maintenance	250	100
Pylon modification ^d	80	68
Other costs ^e	65	65
Total	\$1,741	\$824
Potential reduction	\$74	\$991

^aThese costs were computed by adding costs incurred through fiscal year 1989 to costs planned under each option for fiscal years 1990 to 1996.

^bThese costs were computed by prorating a percentage of the cost for the missiles to the number of missiles the Air Force would buy under each projection.

^cThese costs were computed based on the number of squadrons to be located at each base. For 1,200 missiles, five squadrons would be required at four bases, the same as the Air Force plans for 1,461 missiles. For 510 missiles, only two squadrons would be required.

^dThe cost of modifying 200 pylons is \$80.3 million. For 510 missiles, no additional pylon modifications would be required because the Air Force has already spent \$68 million to modify 93 pylons, more than the number required for 510 missiles.

^eNo savings are projected for other costs (such as depot and base facilities) because either the costs have already been incurred or a reduction in the number of missiles would not substantially affect costs.

Although aware of the Strategic Air Command's requirements and other options for a lesser number of missiles, system program office and logistics managers were continuing efforts to buy and support 1,461 missiles

because the program baseline had not been changed. These managers said that the program plans had not been officially changed because Air Force headquarters or other higher authority had not directed a program change. In their comments on why a change had not been directed in accordance with the Air Force's March 1989 policy on program changes, they said that the Air Force did not have procedures that provided program managers with guidance on what changes should be made to logistics program plans and when these changes should be made. Air Force officials further stated that because logistics support is based on official logistics program plans, potentially unnecessary logistics expenditures could occur until the plans are updated.

Conclusions

The Air Force needs to respond to major Advanced Cruise Missile program changes to preclude potential procurement of unneeded parts and other unnecessary expenditures for logistics support. While we recognize the difficulties in fielding a new weapon system, such as the Advanced Cruise Missile, we believe test results and program progress can be measured and should be considered when planning deployment and making logistics support decisions. Development difficulties in this program resulted in a significant program change affecting the delivery schedule for operational missiles. As a result of basing logistics support on outdated plans, resources were expended prematurely to acquire spares, maintenance and repair capability, and the facilities infrastructure.

To help ensure that Air Force policy requiring an updated program plan is effectively implemented, managers in this program should be provided adequate guidance for assessing what changes should be made to logistics plans and when these changes should be made. In addition, managers should be provided guidance that enables them to identify and defer potentially unnecessary logistics expenditures until logistics plans are updated. Furthermore, the need for adequate guidance to implement the Air Force policy on updating program plans and identifying and deferring potentially unnecessary logistics expenditures effectively would not be limited to this program but would be applicable to other programs.

Recommendation

We recommend that the Secretary of the Air Force ensure that logistics support is based upon current data by developing procedures for revising logistics plans that include guidance for assessing what changes to the plans should be made and when such changes should occur.

Agency Comments and Our Evaluation

In its comments on a draft of this report, DOD generally agreed with our findings but said that (1) its decision to purchase spares during the highly concurrent development and production program was prudent at the time, and the spares were modified to correct technical problems as necessary, (2) facilities constructed for the Advanced Cruise Missile are being used, without modification, for the Air Launched Cruise Missile, and (3) personnel trained to provide operational support to the Advanced Cruise Missile were used to verify maintenance procedures for the missile.

DOD also commented that the official quantity of Advanced Cruise Missiles to be acquired has not changed since the program's inception. According to DOD, all other quantities are based on exercises that occur continually during the budget formulation process. However, DOD agreed that, should it reduce the total number of missiles to be purchased, a cost avoidance would occur. Our review indicated that the Air Force plans to buy 1,461 missiles, but the Strategic Air Command's current requirements are for 1,200.

DOD partially concurred with our recommendation. It agreed that logistics support should be based on current data and modified when program direction is changed. However, it stated that the Program Management Directive process is in place to provide needed guidance to the implementing commands. DOD did not agree that a new set of procedures needs to be developed.

We believe that the Air Force's experience with the logistics support for the Advanced Cruise Missile program indicates that additional guidance is necessary to ensure that plans and expenditures for such support are consistent with current program plans.

Operational Maintainability and Supportability May Be Difficult and Costly

The Air Force spends significant funds to maintain and support fielded weapon systems. Maintaining and supporting the Advanced Cruise Missile will require trained personnel, repairs to components that fail, and adequate supplies of spare parts. The Air Force estimates that the total initial and continuing support cost for the currently programmed 1,461 missiles will be \$1.7 billion for the next 20 years. However, marginal system reliability, multiple configurations, and design and quality problems could make maintaining the missile in the field difficult and more costly than the Air Force estimates.

Logistics Cost Estimates

According to the Air Force's January 1990 estimate, initial logistics support for 1,461 missiles will be \$424.6 million, as shown in table 3.1.

Table 3.1: Initial Logistics Support Costs

Dollars in millions	
Category	Amount
Parts (initial spares)	\$103.7
Support equipment	255.8
Depot facilities	3.1
Base facilities	62.0
Total	\$424.6

The Air Force estimates that operating and maintaining the 1,461 missiles in the field will cost \$1.3 billion from 1990 through 2009. As shown by table 3.2, this includes replenishment spares, depot maintenance, contractor repair, and operation and maintenance costs.

**Table 3.2: Cost to Maintain the Advanced
Cruise Missile**

Dollars in millions	
Category	Program cost
Replenishment spares	\$122
Depot level maintenance	525 ^a
Base level maintenance	50
Operations and maintenance	586 ^b
Total	\$1,283

^aIncludes contractor and Air Force maintenance.

^bExcept for operations and maintenance cost, the Air Force provided the cost for a 20-year period. The operation and maintenance cost is based on Strategic Air Command cost estimates from 1990 through 1995 and a constant 5-percent inflation rate through 2009.

According to Air Force officials, these estimates should include all necessary costs. However, as experience is obtained, some additional costs may be necessary. For example, officials noted that the cost to repair circuit cards could cause logistics costs to increase by \$20 million. Because circuit card repair was not a part of the original repair contract with General Dynamics, the Air Force requested a cost proposal. When General Dynamics responded with a \$119 million proposal, the Air Force began identifying ways to reduce this amount, including using repair facilities at air logistics centers. Air Force officials said they will still require some services from General Dynamics, but they anticipate such services will cost much less than the proposed amount.

Reliability, Design, and Quality Problems Could Increase Costs

Higher than expected maintenance and repair costs and multiple configurations could increase Air Force logistics cost estimates. Moreover, spares costs will increase if component reliability levels are not met. Initiatives are underway to reduce the number of different configurations, ensure that sufficient quantities of spares are available, and improve reliability and quality. However, these initiatives are also costly. For example, the Air Force plans to spend \$70 million to identify and resolve design problems. In addition, according to Air Force officials, if some of the major components, such as the sensor or avionics units, do not meet the required reliability levels, the Air Force will have to buy additional spares. Furthermore, if problems such as reliability shortfalls, fuel leaks, and limited accessibility to subsystems are not resolved, maintaining the missiles will be more costly and will present difficulties for both logistics planners and maintenance personnel.

System Reliability Below Goal

Currently, both the test flight and subsystem reliability levels are below the Air Force's reliability goals for the missile and pose significant concerns for the Air Force and General Dynamics. (Because these goals and levels are classified, these numbers are not identified in this report.) According to Air Force officials, flight test reliability is marginal, but they anticipate the flight reliability level will gradually increase and meet the flight test reliability goals.

Air Force officials said that subsystem level reliability, like flight reliability, also is currently marginal. On the basis of predicted component failure rates, a DOD model predicts the current mission success frequency is below the required reliability levels. The sensor, guidance set, forward and aft avionics units, actuators, altimeter, and deployment system present significant reliability concerns for the missile system.

The Air Force is taking actions that will improve subsystem level reliability and that will make meeting the reliability specification possible. Through enhanced environmental stress screening and improved quality assurance procedures, the Air Force hopes to improve reliability of the sensor and guidance set. Enhanced environmental stress screening involves testing the subsystems before and after they are placed on the system. The Air Force is modifying the forward and aft avionics units and is improving manufacturing of the actuators to help their reliability.

Fuel Leaks Not Resolved

Advanced Cruise Missile fuel leaks are a major concern to the Air Force. Of 25 preoperational missiles delivered to K.I. Sawyer Air Force Base, 10 have developed fuel leaks in varying degrees of severity (7 missiles were returned to the contractor and 3 were repaired on-site).

System technical data make no provision for any allowable fuel leakage. Because the missiles undergo normal electrical testing, Air Force documents note that undetected fuel leaks could create a potential for an explosion and that continued fuel leakage could preclude nuclear certification. Thus, because of its concern about the safety, design, and quality implications of missile fuel leaks, the Strategic Air Command asked the Aeronautical System Division to provide a safety assessment of continued ground testing, maintenance, and handling of the preoperational missiles and the status of the contractor's efforts to correct the fuel leak problem. Also, the Strategic Air Command directed that missiles at K.I. Sawyer Air Force Base be isolated and placed in storage igloos apart from other weapons.

According to Air Force officials, the current fuel leak problem centers around pinholes in the fuel bladder and is not so much a performance issue as it is a safety issue. The fuel bladder does not contain any fuel, but it is used to force fuel to the engine. As the missiles are transported, the constant movement of the fuel tends to cause pinholes in the fuel bladder. When this happens, fuel leaks out the air vents, posing a potential hazardous situation for maintenance personnel. The missile system program office is working with the prime contractor to resolve this problem.

Maintenance Accessibility

According to Strategic Air Command officials, field maintenance accessibility to some of the subsystems requires excessive connects and disconnects. For example, the guidance set, sensor, and air cycle cooling

system are all connected together. To replace one of the systems, maintenance personnel must unhook all three. As a result, maintenance and downtime for the missile increase and the possibility for damage to the subsystems also increases.

Another example identified by the Strategic Air Command as a maintenance accessibility problem relates to the aft avionics unit. Before maintenance personnel can access the unit, they must first remove some of the radar absorbing material on the skin panel. Once accessed, the unit can be replaced rather quickly. However, the problem is the time it takes the radar absorbing material coating to dry as maintenance personnel must replace the coating around the skin panel. Thus, increased downtime is not caused by the actual replacement of the unit but by waiting for the coating to dry.

Multiple Configurations

Logistics planners for the Advanced Cruise Missile are faced with spares support and maintenance on a system with multiple configurations. Multiple configurations arise as problems that were not identified during development surface during production. As a result of the problems, refinements or improvements are made to the system's design, and these improvements are incorporated into production missiles at some point. Missiles before that point are in one configuration and those after that are in another configuration. This requires that spares be on hand and be in the right design for each missile configuration.

The Air Force is reducing the number of missile configurations. The process involves the first 110 missiles and is being done in two phases. The first phase involves reducing the number of configurations from nine to six and making hardware changes to the missiles. This phase is scheduled to begin in August 1990, at no cost to the government. The second phase will begin after the hardware changes are made and will reduce the number of configurations from six to three. According to an Air Force official, this phase involves changes to the engineering drawings and paperwork and will cost an estimated \$180,000. In addition, the Air Force is also studying the feasibility of reducing the number of configurations to two.

According to an Air Force official, one of the lessons they learned from prior missile programs and are trying to avoid on this program is the logistics problems associated with having several configurations. For example, the ground launch cruise missile had 150 configurations, which created logistics support problems for logistics planners. With

this many configurations, logistics support becomes extremely difficult because more spares are needed to support the various configurations.

The Air Force has contracted with McDonnell Douglas Missile Systems Company as a second source of production for this program. The Air Force expects McDonnell Douglas, which began qualification efforts in May 1988, will be qualified as a second source by July 1990. A second source could affect not only the design of the Advanced Cruise Missile but also the spares, configuration control, and logistics support.

As of June 15, 1989, McDonnell Douglas had submitted 572 data/service requests to the Air Force or General Dynamics. In addition, McDonnell Douglas has submitted or intends to submit 97 engineering change proposals and 196 engineering change requests to the Air Force. According to Air Force officials, General Dynamics will remain the sole design agent for this missile system and, in their opinion, a second source will not affect or increase the number of different missile configurations.

Conclusion

Operational maintainability and supportability will be difficult and more costly than projected unless the Air Force overcomes reliability shortfalls, maintenance accessibility on several subsystem components, and multiple configuration designs. The Air Force recognizes these problems and has implemented several initiatives, including reducing the number of missile configuration designs and establishing quality control actions.

Agency Comments

DOD commented that the Advanced Cruise Missile flight test reliability compares favorably to that of other cruise missiles at the same period of development. DOD said that while the missile is not on the postulated reliability growth curve, all of the problems that occurred during flight tests are understood and have been corrected. According to DOD, a bladder comprised of material similar to the one used in the B-52 bombers has undergone qualification testing and has solved the fuel leak problem.

Comments From the Department of Defense



PRODUCTION AND
LOGISTICS

ASSISTANT SECRETARY OF DEFENSE
WASHINGTON, D.C. 20301-8000

13 AUG 1990

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

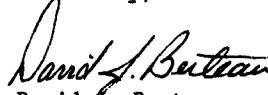
Dear Mr. Conahan:

This is the Department of Defense (DoD) response to the General Accounting Office (GAO) Draft Report, "STRATEGIC MISSILES: Logistics Support for Advanced Cruise Missile Based on Outdated Plans," dated June 7, 1990 (GAO Code 392508/OSD Case 8372). The Department generally concurs with three of the findings and the recommendation; however, the DoD does not concur with Finding D.

The GAO finding regarding opportunities to reduce costs is based on the assumption that the quantity of Advanced Cruise Missiles to be purchased has changed from the existing plans. The original plan and all subsequent plans have retained the same purchase quantity. Regarding findings and the recommendation which specify the need for specific guidance for revising program planning, these plans already exist in a Headquarters Air Force Operating Instruction. Inclusion of another set of duplicative regulations would not aid the acquisition process.

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

Sincerely,


David B. Berteau
Principal Deputy

Enclosure

GAO DRAFT REPORT - DATED JUNE 7, 1990
(GAO CODE 392508) OSD CASE 8372

"STRATEGIC MISSILES: LOGISTICS SUPPORT FOR ADVANCED CRUISE MISSILE
BASED ON OUTDATED PLANS"

DEPARTMENT OF DEFENSE COMMENTS

* * * * *

FINDINGS

- o **FINDING A: Background: The Advanced Cruise Missile Requires Significant Logistics Support.** The GAO reported that the air-launch Advanced Cruise Missile is being developed by the Air Force to enhance the long-term effectiveness of the bomber leg of the strategic triad, with a capability of defeating projected Soviet defenses through the 1990s. According to the GAO, the Advanced Cruise Missile is a subsonic, turbofan-powered missile that will carry a nuclear warhead. The GAO also reported that logistical requirements for the Advanced Cruise Missile include facilities and support equipment for servicing the missile; maintenance planning for contractor and Air Force repair of parts; manpower and personnel; data management systems; training and training support; computer resources support; packing, handling, storage, and transportation; and adequate supplies of parts. The GAO emphasized that effective, efficient, and economical logistics support helps determine whether a weapon system will be ready to perform its mission. The GAO pointed out that the DoD policy on logistics states that primary objectives of the acquisition process are improved readiness and sustainability, and that resources needed to achieve readiness will receive the same emphasis as those required to achieve schedule and performance objectives, while a system progresses through development, testing, production, and deployment. (p. 2, pp. 8-11/Draft Report)

DOD RESPONSE: Concur. The Advanced Cruise Missile will provide significant deterrence well into the next century.

Enclosure

Now on pp. 2, 8, and 10.

- o **FINDING B: Logistics Support Based On Outdated Program Plans.** The GAO found that the Air Force has used outdated program plans to provide logistics support for the Advanced Cruise Missile. According to the GAO, the initial program plan provided for the first operational missile to be delivered in late 1986. The GAO found, however, that test failures, production problems, and other program changes resulted in slippage of the first operational missile delivery until 1990. The GAO found that the Air Force continued to provide logistics support using the original delivery schedules, because program plans were not officially changed. The GAO noted the Air Force did not change program plans until after the Congress eliminated production funds for FY 1989. Additionally, the GAO observed that, even after the Congress eliminated production funds, over one year passed before the Air Force changed the program plan. The GAO also reported that, because logistics support was provided based on outdated data, (1) spares were purchased too early, and limited quantities are becoming unusable as design changes are made, and (2) about \$30 million was spent for Advanced Cruise Missile facilities at an Air Force base that has been deleted from the basing plans for the missile. The GAO also pointed out that the Air Force paid \$7.2 million for contractor repair services through 1989, even though no operational missiles were repaired. The GAO further reported that Air Force personnel, trained to work on the advanced cruise missiles at K.I. Sawyer Air Force Base, were reassigned or separated before working on an operational missile, which will be delivered about 3-1/2 years later than originally planned. The GAO concluded that, as a result of basing logistics support on four year old plans, resources were expended prematurely to acquire spares, maintenance and repair capability, and the facilities infrastructure. (pp. 2-4, pp. 14-21, pp. 25-26/GAO Draft Report)

Now on pp. 3-4 and 12-17.

DOD RESPONSE: Partially Concur. The Department does not agree that the Air Force has used outdated program plans. The Air Force formally updated program plans (Program Management Directives) to the acquiring commands on April 13, 1987; October 8, 1987; June 28, 1988; October 21, 1988; and April 3, 1989. The decision to purchase spares during the highly concurrent development and production program was prudent at the time. When unforeseen technical problems occurred, those spares were modified, as needed, to meet the present configuration.

The \$30 million spent on facilities construction remains an integral part of the strategic cruise missile force structure. While initially planned for the Advanced Cruise Missile, the facilities are being used, without modification, for the Air Launched Cruise Missile force structure--these facilities are common cruise missile facilities that can support the Advanced Cruise Missile or the Air Launched Cruise Missile.

The personnel who received the Advanced Cruise Missile training were already providing operational support to the existing strategic force structure, independent of the Advanced Cruise Missile. In anticipation of Advanced Cruise Missile deliveries, personnel received additional training in areas that were Advanced Cruise Missile specific. None of the personnel were trained or intended for use exclusively on the Advanced Cruise Missile system. However, these personnel, while not supporting operational Advanced Cruise Missiles in the force structure, did contribute to the total system capability. By using their training on pre-operational missiles, they verified maintenance procedures and noted deficiencies that would otherwise have had to be corrected when the system is deployed.

- o **FINDING C: Program Changes Provide Opportunities To Reduce Costs.** The GAO reported that the Air Force system program office plans to buy and logistically support 1,461 Advanced Cruise Missiles, even though the Strategic Air Command has reduced the quantities required, and the Air Force has considered other possible reductions in the quantities of missiles to be bought. According to the GAO, the Air Force has changed plans and now only the B-52H bombers are being modified to carry Advanced Cruise Missiles. The GAO reported that, as a result, when spares and operational test missiles are included, the total procurement is 1,200 Advanced Cruise Missiles. The GAO noted that the Air Force also considered:
 - A total procurement quantity of 1,093. The GAO stated that this quantity was recommended by the Air Force in FY 1989, but was subsequently increased back to 1,461 missiles, without explanation by the Office of the Secretary of Defense.
 - A total procurement quantity of 510 missiles. According to the GAO, this quantity was based on (1) poor Advanced Cruise Missile flight tests at that time, and (2) the need for reduced spending in the 1990 through 1992 time frame. The GAO pointed out that this consideration involved

deploying the missile at two, rather than four bases. The GAO observed that this option was considered for FY 1990, however, the Air Force decided to continue the program at 1,461 missiles.

- A total procurement quantity of 1,000. The GAO stated that, according to Air Force officials, a total quantity of 1,000 missiles is being considered for FY 1991, based primarily on budgetary decisions.

The GAO concluded that reductions in quantities, such as described above, would negate the need for more spares purchases, maintenance and repairs, and other support costs, such as activating additional bases. The GAO also concluded that savings of between \$74 million and \$991 million are possible with reduced quantities. The GAO noted that these savings would be dependent on logistics and support plans being closely tied to revised program plans. (p. 4, pp. 22-23/GAO Draft Report)

Now on pp. 4 and 18-20.

DOD RESPONSE: Partially Concur. The Department disagrees that the total procurement quantity for the Advanced Cruise Missile has been changed. The program baseline quantity has not changed since the inception of the program; the President's Budget and Presidential direction have always been to procure 1,461 Advanced Cruise Missiles. All the other numbers, including the 1,200 quantity, are option possibilities resulting from discussions that continually occur among the Office of the Secretary of Defense, the Air Staff, and the major commands during formulation of each year's budget. The DoD continually reviews the acquisition strategy of the programs it manages. The Air Force cannot, and should not, react at the implementing command level to those many force structure exercises. After review at the highest levels within the Department of Defense, 1,461 has remained the requirement in each of the President's Budgets since the program began. The Department, however, agrees that, should the DoD reduce the total number of items to be purchased, logistics planning should be changed to avoid unnecessary costs.

- o **FINDING D: Guidance Needed For Revising Program Plans.** The GAO reported that, in response to congressional and DoD initiatives for improving the defense acquisition process, the Air Force issued a policy in March 1989, which provides that program plans are to be updated annually or sooner, if significant changes occur. The GAO pointed out that, according to Air Force officials at the program office and logistics managers, the program plans had not been changed, because the Air

Force has no guidance on what changes should be made to program plans and when these changes should be made. The GAO pointed out that officials at Air Force headquarters confirmed that guidance to implement the policy on updating program plans does not exist for the advanced cruise missile or for other programs.

The GAO concluded that, even though Air Force policy exists that directs that cost, schedule, and performance be updated at least annually, the Air Force continues to base logistics support upon plans that do not reflect current requirements for a lesser number of missiles. The GAO suggested that, to help ensure that Air Force policy requiring an updated program plan is effectively implemented, managers in the Advanced Cruise Missile program should be provided adequate guidance for assessing what changes should be made to program plans and when these changes should be made. The GAO added that managers should be provided guidance that enables them to identify and defer potentially unnecessary logistics expenditures, until program plans are updated. Finally, the GAO stated its belief that the need for adequate guidance to effectively implement the Air Force policy on updating program plans and identifying and deferring potentially unnecessary logistics expenditures would not be limited to the Advanced Cruise Missile program, but would be applicable to other programs. (pp. 4-5, pp. 21-22, pp. 25-26/GAO Draft Report)

Now on pp. 3-4, 17-18, and 20.

DOD RESPONSE: Non-concur. The Department disagrees (1) that specific guidance does exist to revise program planning as baseline changes happen, and (2) that the baseline quantity for the Advanced Cruise Missile did, in fact, change. Guidance for updating program plans exists in Headquarters Air Force Operating Instruction 800-2, dated March 1985. As stated in the DoD response to Finding C, after review of Air Force Program Objective Memorandum alternatives at the highest levels within the Department of Defense, 1,461 has remained the requirement in each of the President's Budgets since the program began. If subsequently, a formal baseline change is directed in the FY 1992 President's Budget, the Program Management Directive process is in place to provide guidance to the implementing commands. Regarding the need for issuing guidance due to changes in requirements, the Air Force has updated program plans (see the DoD response to Finding B).

The Department is currently working to improve the acquisition process as a result of the Defense Management Review. As a part of this effort all acquisition regulations/procedures are

being reviewed with the objective of improving and streamlining the acquisition management and oversight procedures.

- o **FINDING E: Operational Maintainability And Supportability May Be Difficult And Costly.** The GAO reported that, according to Air Force estimates for a program of 1,461 missiles, initial logistics costs will be about \$424 million and follow-on costs will total about \$1.3 billion from 1990 through 2009. The GAO cautioned that these estimates are based on achieving projected system reliability levels.

The GAO reported, however, that the Advanced Cruise Missile has marginal system reliability, and design and quality problems, such as fuel leaks, limited accessibility to subsystems, and multiple configurations. The GAO pointed out that, unless these problems are resolved, maintaining the Advanced Cruise Missile in the field will be difficult and could cost more than the Air Force estimates. The GAO observed that initiatives are underway to reduce the number of different configurations, ensure spares availability, and improve reliability and quality. The GAO stated that although the initiatives are costly, they are intended to avoid future increases in logistics support costs.

The GAO concluded that operational maintainability and supportability will be difficult and more costly than projected, unless the Air Force overcomes reliability shortfalls, maintenance accessibility on several subsystem components, and multiple configuration designs. The GAO noted that the Air Force recognizes these problems and implemented several initiatives, including reducing the number of missile configuration designs and implementing quality control actions. (p. 5, pp. 27-33/GAO Draft Report)

DOD RESPONSE: Partially Concur. The DoD does not agree that the Advanced Cruise Missile does not have "marginal" system reliability and design and quality problems. The Advanced Cruise Missile flight test reliability compares favorably to that of other cruise missiles at the same period of development. While the Advanced Cruise Missile is not on the postulated reliability growth curve, all of the problems which have occurred during the flight tests are understood and have been corrected. The Air Force has been directed, within the Defense Acquisition Board process, to identify when the Advanced Cruise Missile will meet its mature reliability requirements. The mature reliability value for the system has not changed since the program inception.

Now on pp. 4 and 22-26.

The fuel leak problem has been fixed. Qualification testing of a B-52 derivative fuel bladder has been completed and these bladders are installed in all missiles delivered to the Strategic Air Command.

All except one subsystem meets the baseline accessibility requirement. The attention to the accessibility of subsystems shows the Air Force's significant concern for maintainability. An indicator of maintainability is Mean Time To Repair. Mean Time To Repair for the system has been measured under actual conditions, using production hardware, and with trained operational personnel, and the measured values are better than the requirement.

As the GAO noted, the multiple configurations are being reduced.

RECOMMENDATION

- o **RECOMMENDATION:** The GAO recommended that the Secretary of the Air Force ensure that logistics support is based upon current data, by developing procedures for revising program plans that include guidance for assessing what changes to the plans should be made and when such changes should occur. (p. 5, p. 26/GAO Draft Report)

DOD RESPONSE: Partially Concur. The Department concurs that the Secretary of the Air Force should ensure that logistics support is based upon current data. The support plans will be modified when program direction is changed by program decisions and/or the President's Budget. The Department does not agree that a new set of procedures needs to be developed, in as much as this recommendation is already implemented within the existing guidance for weapon systems acquisition (Headquarters Air Force Operating Instruction 800-2) .

Now on pp. 5 and 20.

Major Contributors to This Report

**National Security and
International Affairs
Division,
Washington, D.C.**

Norman J. Rabkin, Associate Director
David Childress, Assistant Director

**Kansas City Regional
Office**

Roger L. Tomlinson, Evaluator-in-Charge
Gary L. Nelson, Site Senior
Bonnie S. Carter, Evaluator
Robert W. Jones, Evaluator

Ordering Information

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

**U.S. General Accounting Office
P.O. Box 6015
Gaithersburg, MD 20877**

Orders may also be placed by calling (202) 275-6241.

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

Official Business
Penalty for Private Use \$300

First-Class Mail
Postage & Fees Paid
GAO
Permit No. G100