

September 1994

# B-2 BOMBER

## Cost to Complete 20 Aircraft Is Uncertain



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

National Security and  
International Affairs Division

B-257642

September 8, 1994

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

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

The Honorable Ronald V. Dellums  
Chairman, Committee on Armed Services  
House of Representatives

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

The National Defense Authorization Act for fiscal year 1994 limits how much can be spent on acquiring B-2 aircraft. The conference report on the 1994 Department of Defense (DOD) Authorization Act calls for GAO to report at regular intervals on the total B-2 acquisition costs through completion of the production program. This is the first in a series of reports concerning B-2 acquisition costs. Our objectives were to identify risks that remain in the program and identify issues that could affect the Air Force's ability to complete the acquisition of 20 operational aircraft within the cost limitation.

## Background

The B-2 development program was initiated in 1981 and was followed by approval in 1987 to procure B-2 aircraft concurrently with the development and testing effort. The Air Force's early plans were to acquire 132 operational aircraft; however, the plans were reduced in the early 1990s to 20 operational aircraft.<sup>1</sup> At about the same time, the B-2's mission emphasis was changed from being principally a strategic bomber capable of delivering nuclear weapons to a conventional bomber capable of delivering precision-guided munitions.

<sup>1</sup>This includes 5 test aircraft and 15 production aircraft.

The 1994 Defense Authorization Act, in addition to reaffirming a limit on procuring no more than 20 operational B-2 aircraft, also limited the program acquisition costs to no more than \$28,968.0 million, expressed in fiscal year 1981 constant dollars. Currently, the same program acquisition cost limitation expressed in then-year dollars is \$44,656.0 million.

The last of the 20 operational aircraft are scheduled for delivery in January 1998. These aircraft are required to be low observable aircraft with sufficient range and payload capability to deliver precision-guided conventional weapons or nuclear weapons anywhere in the world with enhanced survivability.

Most B-2 aircraft delivered will not initially meet that requirement. To meet the requirement, 18 of the aircraft, including 5 test aircraft, are scheduled to undergo major modifications after their initial delivery to the Air Force. The modifications now planned are required partly as a consequence of producing the aircraft before the test program uncovered problems and limitations. The modifications are also partly necessitated by the change in the B-2's mission from a nuclear to a conventional bomber. Planned modifications to correct defects and incorporate full conventional and strategic capabilities are scheduled to continue through July 2000. Appendixes I and II include details of the planned modifications.

Although the flight test program began in July 1989, it was only 43 percent complete as of July 31, 1994, because of delays and problems experienced earlier in the test program.

## Results in Brief

Significant development, testing, production, and modification efforts are required before the 20 operational aircraft meet their final<sup>2</sup> performance configuration. Through fiscal year 1994, the Congress has appropriated \$39,639.7 million, about 89 percent of the \$44,656.0 million cost limitation established. Air Force plans indicate that the funding required to complete the program will be spread over the next 10 fiscal years, ending in fiscal year 2004.

Air Force officials believe the total program cost limitation is sufficient to accommodate completion of the B-2 acquisition program. However, the Air Force has not prepared documentation describing its analysis, assumptions, and rationale for the estimate. The lack of the required

<sup>2</sup>The final performance configuration is now defined as a block 30 aircraft with certain other planned performance improvements. See appendix I for definitions of B-2 configurations.

documentation hindered our evaluation of B-2 costs. Further, in October 1993, an independent Air Force review team identified significant risk in sustaining and interim contractor support costs yet to be incurred in the procurement program. The review team noted a need for additional cost analyses and recommended specific analyses be accomplished by the Air Force.

We believe there is uncertainty about whether the Air Force will be able to complete B-2 acquisition within the cost limitation. About 57 percent of the planned flight test hours are not yet completed and testing to date has identified problems that are yet to be corrected. Additional performance problems could be discovered during the remaining testing that would increase program acquisition costs. Correcting problems already identified during testing and new problems identified in the remainder of the test program could cause additional development effort, further extension of development and test schedules, and increased costs to further modify or correct defects on delivered aircraft.

Much of the funding remaining to be appropriated is expected to pay for such things as B-2 support, including support equipment, spares, technical data, and interim contractor support. However, making an accurate estimate of these costs requires that DOD decide on the specific support approach for the B-2. The Congress directed that no funds be used to establish an Air Force organic maintenance support activity for the B-2 until the Undersecretary of Defense, Acquisition, reviewed the infrastructure for the private sector and Air Force depot support and maintenance of the B-2. The Undersecretary was to report no later than May 15, 1994, about the most efficient and cost-effective use of both public and private facilities to support the B-2. As of July 31, 1994, DOD had not issued its report. Until this decision is made, B-2 support costs remain uncertain.

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## Significant Effort Remains to Deliver Fully Operational Aircraft

Through fiscal year 1994, the Congress has appropriated \$39,639.7 million of the \$44,656 million that the Air Force expects to be needed for B-2 acquisition. Significant program efforts are required to complete the acquisition of B-2s. The rest of the funding is to be requested through fiscal year 2004. In addition, the contractor must complete initial delivery of the production aircraft and modify aircraft to the final configuration within the cost and schedule agreed to in the current contract. In a January 1994 evaluation of the B-2 costs, an independent Air Force cost review team identified cost trends that indicated the Air Force needed to take actions

to ensure the program would not cost more than the congressional limit on the B-2 program.

### Remaining B-2 Effort to Be Funded

The Air Force financial plan indicates that \$5,016.3 million in research, development, test, and evaluation (RDT&E) and procurement funding is yet to be appropriated through fiscal year 2004. Table 1 shows the Air Force's current plans for the use of these remaining appropriations.

**Table 1: Planned Use of Funds to Be Appropriated for B-2 Program From Fiscal Years 1995 Through 2004**

Dollars in millions			
<b>RDT&amp;E funding</b>	<b>Amount</b>	<b>Procurement funding</b>	<b>Amount</b>
Air vehicle	\$481.6	Support	\$1,139.5
Weapon delivery systems	209.5	Curtailment/closeout	679.5
Engineering/program management	406.5	Spares	532.8
Test and evaluation	243.1	Interim contractor support	229.1
Support	135.0	Other government costs	122.2
Other government costs	549.8	Retrofit	102.6
Engineering changes	180.0	Engineering changes	5.1
<b>Subtotal</b>	<b>\$2,205.5</b>	<b>Subtotal</b>	<b>\$2,810.8</b>
<b>Total</b>			<b>\$5,016.3</b>

Two major program efforts yet to be funded and executed are identified in table 1 as support (\$1,139.5 million) and interim contractor support (\$229.1 million). DOD has not yet made decisions that are likely to affect the ultimate cost of logistics support. For example, it must decide whether the Air Force or the contractor will perform depot support. Until such decisions are made, estimates of logistics support costs will remain uncertain. The fiscal year 1994 Defense Appropriations Act requires the Undersecretary of Defense, Acquisition, to evaluate the most efficient and cost-effective use of public and private facilities for B-2 depot support. A report should have been submitted to the congressional defense committees by May 15, 1994, but as of July 31, 1994, the report had not been submitted.

The B-2 program office has not completed the cost estimate documentation required for major defense acquisition programs. The cost estimate documentation is to include a detailed record of the estimating procedures and data used to develop the cost estimate. B-2 program

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officials told us they have not completed the documentation because of higher priorities within the program office.

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### Production Aircraft Must Be Delivered and Then Modified

All the production aircraft, except the last two to be delivered, are planned to be subsequently modified. The modifications of these aircraft are currently planned to begin in June 1996 and end in July 2000. In addition, the modification of the five test aircraft are planned to begin in September 1995 and end in May 2000.

Aircraft are scheduled to be delivered in three different configurations, called blocks 10, 20, and 30. The blocks are based on capabilities planned to be demonstrated during the flight test program. Appendix I shows the aircraft capabilities planned in each block. Air Force officials believe the total program cost limitation is sufficient to complete the B-2 acquisition in the block 30 configuration. Appendix II shows the detailed schedule for initial aircraft delivery and subsequent modifications.

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### Air Force Cost Review Team Identified Significant Cost Risks

In October 1993, the Secretary of the Air Force chartered an independent Air Force team to review the B-2 program and determine if it could be executed within the congressional cost limitation. The Principal Deputy Assistant Secretary of the Air Force for Financial Management stated, "The Independent Cost and Executability Review team identified significant cost risk in sustaining and material costs for production and interim contractor support costs for support." One element of the team's analysis showed actual sustaining costs were on a trend to exceed the sustaining costs estimated to complete the B-2 program. The team concluded, however, that the B-2 program could be executed within the cost limitation, provided that B-2 program management actions are successful in changing the existing cost performance trends of the contractor.

Because of the limited financial analysis found during its review and the cost risks that remain, the review team recommended that the Air Force closely monitor the remaining efforts covered by the production contract, noting several reports that should be analyzed and analytical procedures that should be followed. The team also recommended that an annual program office cost estimate be prepared and submitted with the annual B-2 budget request, which would include a detailed analysis of the cost of items such as aircraft production and block 20 and block 30 modifications.

The review team also pointed out that the 1994 Defense Appropriations Act prohibits the Air Force from using funds to establish or support any organic depot maintenance for the B-2 until DOD studies and reports to the Congress on the support concept. The Air Force will fund interim contractor support for interim maintenance until DOD develops and implements a support concept. Since interim contractor support is paid for by procurement funds that are included within the cost limitation, delays in the DOD support decision could extend the time period originally planned for interim contractor support. This could increase interim contractor support costs over the Air Force's estimate.

## Remaining Development Effort Increases Potential for Higher Costs

A major risk to staying within the cost limitation stems from the fact that all the aircraft are being produced with only 43 percent of the flight test program completed as of July 31, 1994. Flight test results are to be used to determine the performance specifications that both production and modified aircraft must achieve. Therefore, until specified performance is demonstrated through the test flight program, the extent to which any further problems will affect development and production costs and schedules is largely unknown. However, based on past experiences with other systems, flight testing typically identifies problems that require financial resources to correct.

Early flight testing of the B-2 uncovered numerous problems such as radar cross-section (RCS) deficiencies and aft deck cracks. Corrective actions have been identified and either have been or will be tested in a B-2 aircraft. The flight test program is, however, not scheduled to be completed until July 1997. As of July 1994, performance testing of offensive and defensive avionics, precision weapons, and range/payload is yet to be completed. Delivery of software to integrate B-2 systems and subsystems, important to meeting test schedules, is not expected to be completed before December 1996. Further, some problems are being encountered with the RCS of production aircraft. The status and plans for completing tests in each of these areas are discussed below.

- **Offensive and defensive avionics.** Avionics have not been fully flight tested in the B-2. Several radar modes and defensive avionics functions, important to the B-2 mission, are scheduled for flight testing as late as 1997. Recent problems with the terrain-following and terrain-avoidance functions of the radar and signal processing capacity in Band 1 of the defensive avionics subsystem have delayed flight testing of the radar and defensive avionics subsystem.



Problems with the terrain-following and terrain-avoidance functions will cause about a 1-year delay in the scheduled flight testing of selected parts of these functions. Air Force engineers stated that changes to the avionics software have reduced the rate of occurrence of some of the problems. Additional software changes and flight testing are still required to resolve all the current deficiencies. However, Air Force officials noted that aircraft delivered in the block 10 configuration are not required to have an effective terrain-following and terrain-avoidance capability. Accordingly, acceptance of block 10 aircraft will not be delayed. We are concerned because the Air Force experienced development problems with the B-1B terrain-following radar mode that delayed its full capability until well after the B-1B's initial operational capability date.

The contractor has developed software changes to avoid the conditions causing the signal processing capacity problem with Band 1 of the defensive avionics. This will allow the continuation of flight testing for other defensive functions but does not resolve the signal processing capacity problem. Air Force engineers told us they have not determined if the problems are caused by deficiencies in the hardware or software.

- Precision weapons. The principal mission of the B-2 was changed from nuclear to conventional bombing missions in late 1992. To make effective use of the expensive and complex B-2 aircraft, the Air Force planned to incorporate new conventional munitions with precision capabilities. These new munitions, the Joint Direct Attack Munition (JDAM) and Tri-Service Standoff Attack Missile (TSSAM), are planned to be the primary conventional weapons to be used by the B-2. These weapons are still in development, and integration flight testing is not scheduled to begin until 1995 or later.
- Range/payload. The flight testing was planned to be completed in July 1994, but data analysis is not scheduled to be completed until December 1994. About one-third of the test points were completed as of April 1994. Estimated capability based on preliminary test data show the B-2 should meet the range/payload requirements. However, Air Force officials said the margin for error is small for some of the specification range requirements.<sup>3</sup>
- Integration software. The B-2 flight test schedule depends on the delivery of the software that integrates the functions of the various subsystems into the aircraft so it can perform as an operational military aircraft. Critical

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<sup>3</sup>Ten aircraft will be heavier than the specification aircraft by about 3,000 pounds. This equates to reduced aircraft range (unrefueled distance) of between 40 and 150 miles, depending on the altitude of the aircraft.

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functions that remain to be incorporated into the test aircraft include the Global Positioning Satellite system (GPS), TSSAM, final defensive system, Band 4 defensive capabilities, GPS Aided Targeting System, and JDAM. In addition, any problems identified during flight testing must be resolved, and software updates will be required. The remaining development integration software versions are scheduled to be delivered to the flight test program through December 1996. Final block 30 production software is not scheduled to be delivered until January 20, 1997. Historically, software has been a source of development problems that resulted in schedule delays and cost overruns. Both the C-17 and the F-14D experienced such software development problems.

- RCS. The Air Force has done extensive testing to demonstrate capabilities and correct serious problems identified earlier in the test program. As of July 31, 1994, however, flight testing of a fully configured block 30 aircraft has not been accomplished. Flight tests to demonstrate RCS in a block 30 aircraft are scheduled to begin in late 1995 after a test aircraft has been modified to include RCS enhancements and other block 30 changes.

Before the Air Force accepts delivery of early production aircraft, limited RCS acceptance testing is to be completed to determine if the aircraft meets the block 10 acceptance criteria. The second and third production aircraft were scheduled for delivery on March 31, 1994, and July 31, 1994, but the Air Force refused to accept delivery because RCS performance did not meet the acceptance criteria. Officials stated aircraft failed to meet the criteria because of a slight change in the process used to manufacture the aircraft tailpipe. They said the manufacturing process has been corrected and new tailpipes have been installed and successfully tested on one of the aircraft, bringing it into compliance with the block 10 RCS acceptance criteria. The Air Force accepted the aircraft on August 17, 1994.

Other RCS problems resulting from the manufacturing process were identified during the acceptance testing of the third production aircraft and have been corrected, according to Air Force officials. However, flight testing of the additional corrective measures has been delayed because problems with the aircraft's environmental control system have prevented further acceptance flight testing. These RCS problems show how sensitive RCS is to small changes in the aircraft or its manufacturing process and raises concerns about production repeatability of the specified RCS.

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## Recommendations

We recommend that the Secretary of the Air Force

- direct the B-2 Program Office to complete the annual cost estimate and the supporting documentation for the fiscal year 1996 President's budget and
- require that office to prepare updated cost estimates and the supporting documentation before future annual budgets are submitted to the Congress.

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## Agency Comments and Our Evaluation

In commenting on a draft of this report, DOD concurred with our findings and stated that it would direct the Air Force to take action on our recommendations. DOD acknowledged that significant work remained to deliver fully operational B-2 aircraft but said that remaining tasks are on contract and the amount of work required is understood by the Air Force and the contractor. In addition, the Air Force is currently monitoring the key cost elements of the B-2 program. DOD stated continued interim contractor support costs for the B-2 remains an open issue, as they have not yet decided whether to support the B-2 with organic or contractor maintenance. Until this support issue is resolved, DOD states pressure will continue on the cost cap.

Although DOD is correct in saying that most major program efforts yet to be funded are on contract, we would point out that many are contract options that are to be exercised as far in the future as the year 2002. Furthermore, the B-2 development contract will be incrementally funded for several more years. With only 43 percent of the flight test program complete, uncertainties exist that can affect both development and production costs. These uncertainties are potentially of greater risk to the B-2 program because of the extensive amount of concurrency between development and production. DOD's comments are reprinted in their entirety in appendix III.

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## Scope and Methodology

We reviewed available documents and records and interviewed officials at the B-2 Program Office, Wright-Patterson Air Force Base, Ohio; the Departments of Defense and the Air Force, Washington D.C.; and the Northrop B-2 Division, Pico Rivera and Palmdale, California.

We performed our review from January 1994 through August 1994 in accordance with generally accepted government auditing standards.

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Unless you publicly announce its contents earlier, we plan no further distribution of this report until 15 days from its issue date. At that time, we will send copies to the Ranking Minority Members of the Senate and House Committees on Armed Services; Subcommittees on Defense, Senate and House Committees on Appropriations; the Secretaries of Defense and the Air Force; the Director of Office of Management and Budget; and other interested parties. We will make copies available to others upon request.

This report was prepared under the direction of Louis J. Rodrigues, Director, Systems Development and Production Issues, who may be reached on (202) 512-4841 if you or your staff have any questions concerning this report. Other contributors to this report are listed in appendix IV.



Frank C. Conahan  
Assistant Comptroller General



# B-2 System Block Capabilities

Capability categories	Block 10	Block 20 modifications	Block 30 modifications and performance improvements
Mission survivability Low observable	Initial signature	Band 1-3 awareness	Final signature Band 4 awareness <sup>a</sup> Contrail Management System <sup>a</sup>
Terrain following/ terrain avoidance (TF/TA)	Visual contour flying	Limited TF/TA	Full TF/TA
Radar	6 radar modes	11 radar modes	19 radar modes
Navigation	Stellar/inertial navigation	Global Positioning Satellite system (GPS) <sup>a</sup>	Full specification requirements
Fixed target effectiveness	Limited mark-84 (2,000 lb) and B-83 nuclear bomb	Full mark-84 bombs Precision-guided munitions GPS-Aided Targeting System	Full B-83/B-61 bomb rack assembly weapons Joint Direct Attack Munition <sup>a</sup>
Deployability	No requirement	Deployable for 14 days	Deployable for 30 days
Command and control	Normal Air Force Satellite Communications System Normal and secure VHF/UHF	Secure high frequency	MILSTAR - UHF <sup>a</sup>
Air refueling	KC-10/135 directed rendezvous	Autonomous rendezvous defensive avionics single on single	Autonomous rendezvous multiple on multiple JP-8
Flying qualities	Limited aero envelope Limited autopilot 80 percent loads clearance Limited weapons bay door envelope Tactical air navigation and instrument landing system approaches Light to moderate weather	Full aero envelope Full auto pilot 100 percent loads clearance Full weapons bay door envelope Radar coupled approaches All weather	
Ground mission planning	Unit-level mission planning		Deployable unit mission planning
In-flight mission planning	In-flight route changes	In-flight mission changes	In-flight mission changes
Training	Training systems compatible	Training systems compatible	Training systems compatible
Reliability/ maintainability	On aircraft - all Air Force Off aircraft - limited Air Force/limited interim contractor support	Off aircraft - Air Force/interim contractor support/ contrac support mix	Off aircraft - Air Force/ contractor logistics supportor mix
Other			Pilot vehicle interface <sup>a</sup> Defensive management system tools <sup>a</sup>

<sup>a</sup>Characteristics are planned performance improvements and are not yet contractually definitized.

# B-2 Planned Delivery and Modification Dates

Aircraft <sup>a</sup>	Initial delivery <sup>b</sup>	Block 20 modifications		Block 30 modifications	
		Start	Complete	Start	Complete
1	Test			Sept. 1, 1995	Mar. 31, 1999
2	Test			Dec. 1, 1997	Feb. 28, 2000
3	Test			June 1, 1998	May 31, 2000
4	Test			Jan. 1, 1997	July 31, 1998
5	Test			Apr. 1, 1998	Dec. 31, 1999
6	Aug. 31, 1994 <sup>c</sup>			Feb. 1, 1997	May 31, 1998
7	Dec. 17, 1993			Aug. 1, 1996	Dec. 31, 1997
8	Mar. 31, 1994 <sup>d</sup>			Nov. 1, 1996	Mar. 31, 1998
9	July 31, 1994 <sup>e</sup>			June 1, 1996	Sept. 30, 1997
10	Oct. 31, 1994			Sept. 1, 1997	Dec. 31, 1998
11	Jan. 31, 1995	Dec. 1, 1996	Jan. 31, 1997	Apr. 1, 1998	July 31, 1999
12	Apr. 30, 1995	Apr. 1, 1997	May 31, 1997	Mar. 1, 1999	June 30, 2000
13	Oct. 31, 1995	Aug. 1, 1996	Sept. 30, 1996	July 1, 1997	Oct. 31, 1998
14	Jan. 31, 1996	Oct. 1, 1996	Nov. 30, 1996	Feb. 1, 1998	May 31, 1999
15	Apr. 30, 1996	Feb. 1, 1997	Mar. 31, 1997	July 1, 1998	Sept. 30, 1999
16	July 31, 1996			Nov. 1, 1998	Jan. 31, 2000
17	Sept. 30, 1996			Jan. 1, 1999	Apr. 30, 2000
18	Dec. 31, 1996			May 1, 1999	July 31, 2000
19	Oct. 31, 1997				
20	Jan. 31, 1998				

<sup>a</sup>There is a sixth test aircraft that is not currently planned to be modified to operational capability. (Program, therefore, has 21 total aircraft.)

<sup>b</sup>Five test aircraft are planned to be modified and delivered to the Air Force in block 30 configuration after flight test completion. Ten aircraft are planned to be delivered to the Air Force in block 10 configuration. Five of these are planned to be modified to block 20 configuration. All 10 of these are planned to be modified to block 30 configuration. Three aircraft are planned to be delivered to the Air Force in block 20 configuration and then modified to block 30 configuration. Two aircraft are planned to be delivered to the Air Force in block 30 configuration.

<sup>c</sup>This aircraft underwent special testing and is planned to be delivered out of sequence.

<sup>d</sup>Air Force acceptance of this aircraft was delayed because of RCS problems. It was accepted on August 17, 1994.

<sup>e</sup>Air Force acceptance of this aircraft was delayed because of RCS problems. It is now scheduled for acceptance on September 6, 1994.

# Comments From the Department of Defense



ACQUISITION AND  
TECHNOLOGY

OFFICE OF THE UNDER SECRETARY OF DEFENSE

3000 DEFENSE PENTAGON  
WASHINGTON DC 20301-3000



11 AUG 1994

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

Dear Mr. Conahan:

This is the Department of Defense (DoD) response to the General Accounting Office (GAO) draft report, "B-2 BOMBER: Cost to Complete 20 Aircraft is Uncertain," dated July 8, 1994 (GAO code 707058), OSD Case 9717. The Department concurs with the report.

The Department agrees that significant work remains in the B-2 program to deliver fully operational aircraft; however, the tasks identified are on contract, and the workload for each is understood by the System Program Office, the Defense Plant Representatives Office, and the contractor.

The Air Force is closely monitoring the key cost elements of the B-2 program, specifically in the areas of sustaining and material costs for production, and interim contractor support costs for support. The Defense Plant Representatives Office reports that a review of cost/schedule data in April 1994 shows that the cost performance index (a measure of planned versus actual cost) and the schedule performance index (a measure of planned versus schedule progress) for sustaining engineering and material costs, for both the development and production contracts, are meeting expectations and do not indicate an increased risk of a behind-schedule condition. Continued interim contractor support (funded within the cost cap) for the B-2 remains an open issue, as the Department has not yet decided whether to support the B-2 with organic or contractor-supplied maintenance. Until that issue is resolved, pressure on the "cost cap" will continue. The Department still believes, however, that management action will ensure that the B-2 program is completed within the congressionally-mandated cost ceiling.

With regard to the two GAO report recommendations, the Department will ensure that the Air Force completes all required documentation for the FY 1996 President's Budget submission. The Department appreciates the opportunity to comment on the draft report.

George R. Schneiter  
Director  
Strategic and Space Systems

Enclosure





GAO DRAFT REPORT - DATED JULY 8, 1994  
(GAO CODE 707058) OSD CASE 9717

"B-2 BOMBER: COST TO COMPLETE 20 AIRCRAFT  
IS UNCERTAIN"

DEPARTMENT OF DEFENSE COMMENTS

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FINDINGS

- o **FINDING A: Significant Effort Remains To Deliver Fully Operational Aircraft.**  
The GAO observed that, of the amount appropriated through FY 1994, the Air Force has \$39,639.7 million available of the \$44,656.0 million needed for B-2 acquisition. The GAO found that significant program efforts are required to complete the acquisition of B-2s. The GAO also noted that the contractor must complete initial delivery of the production aircraft and modify aircraft to the final configuration within the cost and schedule agreed to in the current contract. The GAO also observed that the Air Force financial plan indicates \$5,016.3 million in research, development, test, and evaluation and procurement funding is yet to be appropriated through FY 2004. The GAO also found that major program efforts yet to be funded and executed include support and interim contractor support, initial spares, curtailment and close-out costs, and completion of aircraft development and the flight test program.

The GAO also observed that the Fiscal Year 1994 Defense Appropriations Act required the Under Secretary of Defense (Acquisition and Technology) to evaluate the most efficient and cost-effective use of public and private facilities for B-2 depot support, and to submit a report to the Congressional defense committees by May 15, 1994; however, the GAO noted that, as of June 23, 1994, the report had not been submitted.

The GAO also found that the B-2 program office has not completed the cost estimate documentation required of major defense acquisition programs. The GAO indicated that the cost estimate documentation is to include a detailed record of the estimating procedures and data used to develop the cost estimate. The GAO noted that B-2 program officials indicated they have not completed the documentation because of higher priorities within the program office.

The GAO also found that most of the production aircraft (all except the last two to be delivered) are planned to be subsequently modified beginning in June 1996 and ending in July 2000. In addition, the GAO found that the modification of the five test aircraft is planned to begin in September 1995 and end in May 2000. The GAO also observed that

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Now on pp. 3-6.

the aircraft are scheduled to be delivered in three different configurations called blocks 10, 20, and 30, and that the blocks are based on capabilities planned to be demonstrated during the flight test program. The GAO noted that Air Force officials believe the total program cost limitation is sufficient to complete the B-2 acquisition in the block 30 configuration. (pp. 6-10/GAO Draft Report)

**DoD Response:** Concur. It should be stressed that the major program efforts yet to be funded and executed (support and interim support, initial spares, curtailment and close-out costs, and completion of aircraft development and the test program) are on contract, and the workload for each is understood by the System Program Office, the Defense Plant Representatives Office, and the contractor.

Continued interim contractor support (funded within the cost cap) for the B-2 remains an open issue, as the Department has not yet decided what the mix will be for organic and contractor depot maintenance. Until that issue is resolved, pressure on the "cost cap" will continue. The Department still believes, however, that continued management emphasis will ensure that the B-2 program is completed within the congressionally-mandated cost ceiling.

The Air Force will complete the cost estimate documentation required for a major acquisition program prior to the FY 1996 budget submission in January 1995.

- o **FINDING B: The Air Force Cost Review Team Identified Significant Cost Risks.** The GAO observed that, in October 1993, the Secretary of the Air Force chartered an independent Air Force team to review the B-2 program and determine if it could be executed within the congressional cost limitation. The GAO indicated that the Principal Deputy Assistant Secretary of the Air Force for Financial Management stated the Independent Cost Executability Review team identified significant cost risk in sustaining and material costs for production and interim contractor support costs. The GAO noted that one element of the team analysis showed actual costs were on a trend to exceed the estimated sustaining costs. However, the GAO found that the independent team concluded the B-2 could be executed within the cost limitation, provided that B-2 program management actions were successful in changing the existing cost performance trends of the contractor. The GAO also found that, because of the limited financial analysis found during the review and the cost risks that remain, the independent review team recommended the Air Force closely monitor the remaining efforts covered by the production contract, noting several reports that should be analyzed and analytical procedures that should be followed.

The GAO also found that the team recommended an annual program office cost estimate be prepared and submitted with the annual B-2 budget request to include a detailed analysis of the cost of items, such as aircraft production and block 20 and block 30 modifications. The GAO also observed that the review team pointed out the 1994

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Defense Appropriations Act prohibits the Air Force from using funds to establish or support any organic depot maintenance for the B-2 until the DoD studies and reports to the Congress on the support concept. The GAO explained that interim contractor support is funded by the Air Force for interim maintenance until a support concept is developed and implemented. The GAO concluded that, since interim contractor support is paid for by procurement funds that are included within the cost limitation, delays in the DoD support decision could extend the time period originally planned for interim contractor support and, therefore, increase interim contractor support costs over those estimated by the Air Force. (pp. 11-12/GAO Draft Report)

**DoD Response:** Concur. The Air Force is closely monitoring the key cost elements of the B-2 program, specifically in the areas of sustaining and material costs for production, and interim contractor support costs for support. The Defense Plant Representatives Office shows positive cost trends in both sustaining engineering and material on the development and the production contracts. A review of the Cost/Schedule data as of April 1994 for sustaining engineering on the development contract shows a cumulative Cost Performance Index (a measure of planned versus actual cost) of 1.0, and on the production contract, it is 1.002. That data indicates that cost performance is as expected on the development contract and slightly better than expected on the production contract. The Schedule Performance Index (a measure of planned versus schedule progress) for sustaining engineering is 1.0 for both the development and production contracts. That data does not indicate an increased risk to sustaining engineering cost due to a behind-schedule condition.

The Defense Plant Representatives Office shows positive cost trends in material costs for production and interim contractor support. The Cost Performance Index for material on the development contract is 1.001 and on the production contract is 0.999. The Schedule Performance Index for material on the development contract is 1.0 and on the production contract is 1.006. That data indicates that both cost and schedule performance are tracking to the schedule, and that risk is within the bounds of management attention.

- o **FINDING C: Remaining Development Effort Increases Potential For Higher Costs.** The GAO concluded that a major risk to staying within the cost limitation stems from the fact that all of the aircraft are being produced with only 41 percent of the flight test program completed as of May 31, 1994. The GAO observed that flight test results are to be used to determine the performance specifications that both production and modified aircraft must achieve. Therefore, until specified performance is demonstrated through the test flight program, the GAO asserted that the extent to which any further problems will impact development and production costs and schedules is largely unknown, and that flight testing typically identifies problems that require financial resources to correct. The GAO found that early flight testing of the B-2 uncovered numerous problems, such as radar-cross-section deficiencies and aft-deck cracks. The GAO noted that, although

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Appendix III  
Comments From the Department of Defense

Now on pp. 6-8.

corrective actions have been identified and either have been or will be tested in a B-2 aircraft, the flight test program is not scheduled to be completed until July 1997. The GAO also found that, as of May 1994, (1) performance testing of offensive and defensive avionics, precision weapons, and range/payload is yet to be completed, (2) delivery of software to integrate B-2 systems and subsystems (important to meeting test schedules) is not expected to be completed before January 1997, and (3) some problems are being encountered with the radar cross section of production aircraft. (pp. 13-17/GAO Draft Report).

**DoD Response:** Concur. The remaining flight/development effort has the potential for increased costs; however, both the Government and Northrop use historical data to develop a change curve prediction to estimate future costs resulting from potential deficiencies discovered during the flight test program. The "capped" B-2 funding profile makes allowance for future changes.

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RECOMMENDATIONS

Now on p. 9.

- o **RECOMMENDATION 1:** The GAO recommended that the Secretary of the Air Force direct the B-2 Program Office to complete the annual cost estimate and the supporting documentation for the FY 1996 President's budget. (p. 17/GAO Draft Report)

**DoD Response:** By August 30, 1994, the Department will direct the Air Force to complete all required documentation for the FY 1996 President's Budget submission.

Now on p. 9.

- o **RECOMMENDATION 2:** The GAO also recommended that the Secretary of the Air Force require the B-2 Program Office to prepare updated cost estimates and the supporting documentation before future annual budgets are submitted to the Congress. (p. 17/GAO Draft Report)

**DoD Response:** By August 30, 1994, the Department will direct the Air Force to complete all required documentation for the FY 1996 President's Budget submission.

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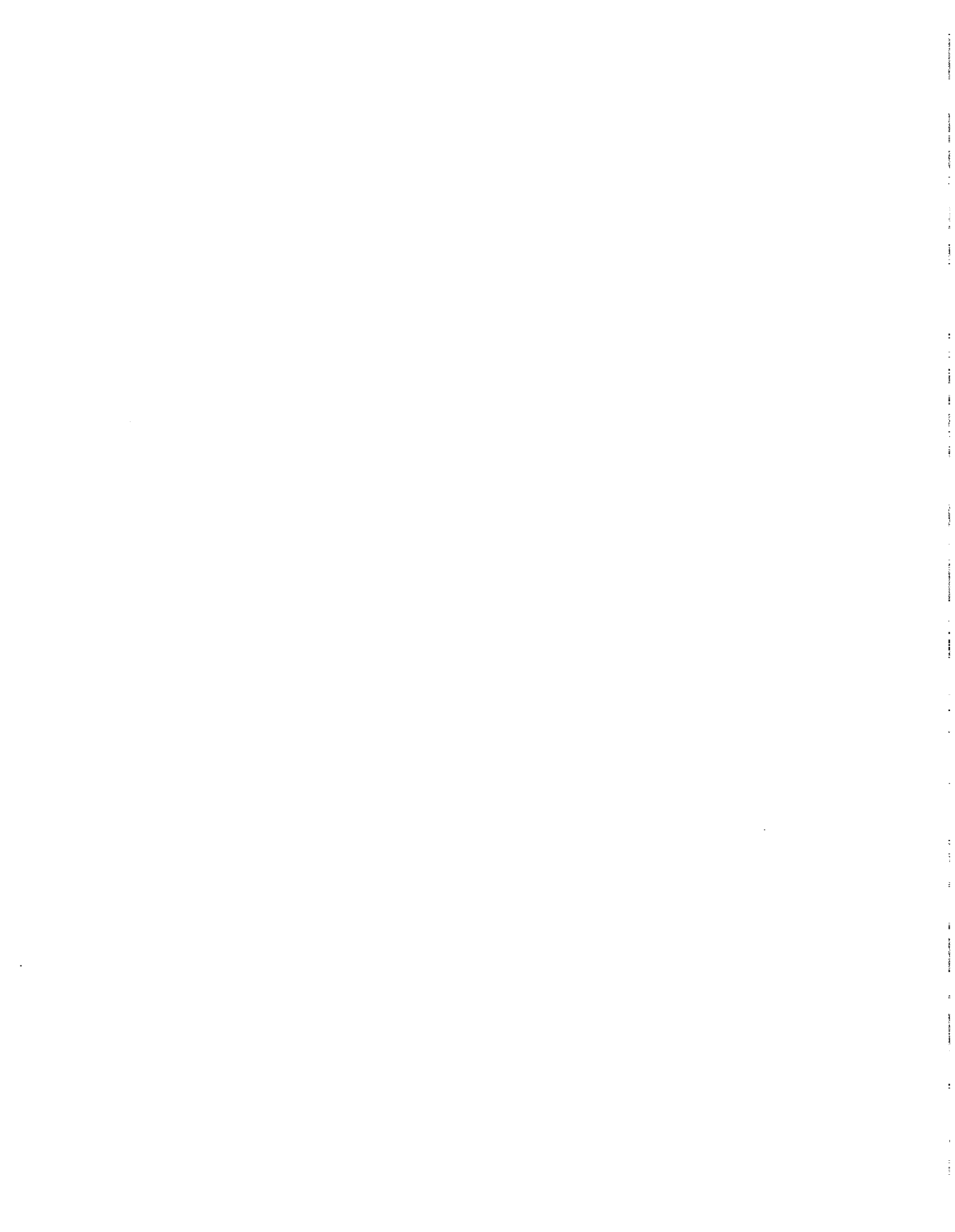
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