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Report to Congressional Requesters

December 1992

B-2 BOMBER

Status of Compliance With the 1992 and 1993 Defense Authorization Act

GAO/NSIAD-93-46

GAO

United States
General Accounting Office
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National Security and
International Affairs Division

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December 4, 1992

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

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

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

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

The B-2 Program has been of keen interest to the Congress, evidenced by legislation enacted over the past 2 years that restricts the program's use of appropriations until the Secretary of Defense certifies progress has been made in demonstrating specific B-2 performance characteristics. This report provides the status of these demonstrations. Specifically, the report discusses actions taken by the Department of Defense (DOD) as required by section 131 (c) and (e) of the Defense Authorization Act of 1992 and 1993. It also discusses the status of the continuing "long lead" production effort on the 16th through the 20th aircraft, the last five B-2s that DOD intends to procure but which have only been conditionally authorized by the Congress.

Background

The fiscal year 1992 and 1993 Defense Authorization Act authorized $2.8 billion for procurement of B-2 bombers, of which $1 billion was specifically earmarked for procurement of one new B-2 aircraft that has been conditionally authorized for fiscal year 1992. The new aircraft is the 16th of 20 operational B-2s DOD intends to acquire. The 20 aircraft include 5 of 6 development aircraft to be reworked, refurbished, and delivered for Air Force operations, and 15 production aircraft. Subsequently, after the Congress had appropriated $2.8 billion for B-2 procurement, the Congress rescinded $500 million of the fiscal year 1992 B-2 procurement funds.

Section 131 was included in the act to ensure that specific performance characteristics of the B-2 were demonstrated before the fiscal year 1992 funds were obligated for procurement of the 16th aircraft. These characteristics included flying qualities, navigation, radar cross section, air vehicle performance, structural integrity, offensive and defensive avionics, and weapons separation. The act requires the Secretary of Defense to submit certifications and reports to the Congress regarding those characteristics. It further provides that no funds may be obligated for procurement of the 16th aircraft until a subsequent act has been enacted authorizing the obligation of funds.

Section 131 of the act was influenced by a briefing provided to the Senate Armed Services Committee by the Rand Corporation in July 1991. The research leading to the briefing was sponsored by the Office of the Secretary of Defense. The Rand Corporation concluded that DOD could, by mid-1992, complete enough testing to provide high confidence that there are no performance problems so serious that they might justify termination of the program. The Rand conclusions were based on assumptions that the test schedule would be maintained and problems would be corrected in a timely and effective manner. While offensive and defensive avionics are included as critical performance characteristics in the act, the Rand briefing concluded that avionics testing in the flying test bed (a modified C-135 cargo aircraft) was adequate to ensure that the avionics subsystems could be made to perform at an acceptable level.

Results in Brief

The flight test program continues behind the schedule the Air Force planned in 1989, when the first development aircraft was delivered and the flight test program began. In April 1991, we reported that the planned completion of the flight test program had slipped from 1993 to 1995.[1] However, the Air Force's schedule approved in 1991 extends flight tests to August 1996 because of problems during flight testing and the late delivery of flight test aircraft. For example, the fourth development aircraft was delivered in April 1992, 12 months behind the schedule planned when the flight test program began. Some improvements have been made, however, with flight test activities accelerating since April 1992.

Air Force officials stated that, based on June 1992 test schedules for the B-2, DOD will not be able to complete the demonstrations needed to satisfy the provisions of the act until early 1993, and will be unable to submit a

[1] B-2 Bomber: Early Radar Signature Tests (GAO/NSIAD-91-188, Apr. 15, 1991).

certification of compliance until mid-1993. At that time, however, the certification will be made without actual flight tests of integrated offensive and defensive avionics on a B-2 aircraft. The Air Force believes that testing in the laboratory and with the flying test bed will supplement partial B-2 flight testing and will support the certification. Although supplemental testing will help reduce risks, we believe DOD will not be able to demonstrate a high degree of confidence in mission accomplishment for all critical performance characteristics specified in the act until integrated offensive and defensive avionics are flight tested on a B-2 aircraft.

Although the act restricts obligating fiscal year 1992 funds to procure the 16th aircraft, the Congress has appropriated funds permitting DOD to initiate and continue long lead efforts for the 16th through 20th aircraft. Fiscal year 1992 and prior years' procurement funds of about $1 billion have been obligated through August 31, 1992, for long lead production activities on those aircraft. These funds have enabled the Air Force to proceed with the fabrication of the last 5 aircraft. As of September 30, 1992, these aircraft had not entered final assembly.

Progress of the Flight Test Program Has Not Met Earlier Plans

Although funds for the B-2 development program have been authorized and appropriated as requested since its beginning in 1981, the development program has been delayed and flight test hours have not been accumulated as quickly as the Air Force had planned. The flight test plan in July 1989 was expected to take 54 months to accumulate 3,600 flight test hours, but has been extended to 86 months and 4,000 hours, according to the 1991 plan. This plan is expected to be completed in August 1996. As of September 30, 1992, the Air Force had flown 799 hours, or 20 percent, of the planned 4,000-hour flight test program.

Several factors have contributed to the delay in the flight test program. First, development aircraft 1 through 5 were delivered 6 to 15 months behind schedule and the last development aircraft is expected to be delivered a year or more later than planned in 1989. Second, in September 1991, the Air Force announced that problems had been encountered in demonstrating the aircraft's radar cross section, an important element of its survivability. Diagnostics, analyses, and retesting have been required to identify solutions to these problems. Third, development aircraft have been delivered incomplete to the test force, making them unavailable for flight testing while additional manufacturing work and design changes are completed.

The impact of delays caused by completing manufacturing work after delivery of test aircraft to the flight testing location, and design changes is shown in table 1. Table 1 compares the number of months, in the 1989 and 1991 flight test plans, that each of the six development aircraft were expected to be unavailable for flight tests.

Table 1: Months B-2 Aircraft Will Be Unavailable for Flight Tests After Delivery to the Test Program

Aircraft	Months unavailable 1989 plan	Months unavailable 1991 plan	Difference (months)
1	6	20	14
2	0	9	9
3	0	15	15
4	0	7	7
5	0	5	5
6	0	5	5

Table 1 shows that, in 1989, the Air Force expected that the first development aircraft would be unavailable for flight testing for 6 months after its delivery to the Air Force for the flight test program. All other development aircraft were expected to be available for flight testing upon their delivery to the test force. The 1991 plan, however, shows a substantial change in aircraft availability, with the first development aircraft being unavailable for 20 months and the remaining development aircraft being unavailable for 5 to 15 months.

While the Air Force has had difficulty in flying planned test hours since July 1989, it significantly increased monthly flight hours beginning in April 1992. Air Force officials said development aircraft were available to fly more often and were not being modified or undergoing manufacturing-type activities. In addition, the aircraft experienced fewer problems and weather conditions did not shorten flight test missions as much as in the past. Air Force officials said that the 1991 flight test plan is being updated but was not finalized as of September 30, 1992.

Schedule for Meeting Certification Requirements

Section 131 of the act prohibits the obligation of funds for procurement of the 16th aircraft, conditionally authorized for fiscal year 1992, until DOD flight tests certain B-2 performance characteristics and demonstrates with high confidence that the B-2 can accomplish its mission. A June 1992 Air Force briefing, and discussions with Air Force officials, indicate that the earliest the Air Force could complete the demonstrations they identified as

necessary to meet the act's requirements is early 1993. As a result, Air Force officials said they will be unable to make the certification until mid-1993. They said the certification requirements will be handled in separate stages. The first stage includes requirements the Air Force believes have been met as of August 1992. The Air Force is currently accumulating the documentation they believe supports the achievement of these requirements. The later stages will include satisfying the remaining requirements in the act.

Table 2 shows the certification requirements for the B-2 identified in the act and the Air Force schedule for completing tests to ensure that these requirements are met.

Table 2: B-2 Certification Requirements Included in Section 131 (c) and (e) of the 1992 and 1993 Defense Authorization Act and Air Force Schedule for Completion

Certification requirements	Planned completion
The fiscal year 1991 milestones in the full performance matrix have been met	June 1992
No major aerodynamic or flight worthiness problems were identified before October 1991	June 1992
The ability to update the navigation system with the Coherent Map Mode of the radar has been successfully demonstrated	June 1992
The basic capabilities of X and KU band transponders have been successfully demonstrated	November 1992
The baseline analysis of the radar cross section signature data for the first test aircraft has been completed	March 1993
The test program for the B-2 aircraft has sufficiently demonstrated the following critical performance characteristics from flight testing to provide a high degree of confidence in mission accomplishment:	
—detection and survivability	July 1992
—air vehicle performance	June 1992
—strength and durability of the structure	August 1992
—offensive and defensive avionics	March 1993
—weapon separation testing planned to take place during fiscal year 1992	October 1992
The original radar cross section operational performance objectives have been successfully demonstrated from flight testing	June 1992

Test Results

According to the Air Force, testing has progressed far enough to satisfy many of the certification requirements, including the

- fiscal year 1991 milestones in the full performance matrix,
- identification of no aerodynamic or flight worthiness problems before October 1991, and
- ability to update the navigational system.

The full performance matrix compares planned test progress with program milestones, such as annual production decisions. It is made up of technical requirements that are planned to be demonstrated each year based on schedules for laboratory analyses and/or B-2 flight tests. The technical requirements are progressive, with a goal of demonstrating overall B-2 performance at the conclusion of the test program in 1996 and at system maturity. About 25 technical requirements are needed to achieve the fiscal year 1991 milestone, which is to support the decision to produce the fiscal year 1992 aircraft. These technical requirements address mission performance, low observable characteristics, air vehicle performance, integrated logistics support, mission planning system, and training systems. The cut-off date for data collection for the fiscal year 1991 milestone was September/October 1991. The cut-off date for the fiscal year 1992 milestone was September/October 1992. Following are examples of some test results the Air Force provided us as evidence that selected technical requirements have been met for fiscal year 1991 milestone:

- A matrix requirement for mission performance included a demonstration of the B-2's ground alignment modes through functional and integration tests of the navigation system in flight. These were successfully demonstrated in September 1991.
- Another matrix requirement for mission performance included a demonstration of radar power management features during functional and integration tests in flight. The B-2 radar is designed to permit the management of power to maintain a low probability that radar signals emitted from the radar could be used by an adversary to detect the B-2. This function requires the radar to use less power but produce radar maps of a quality equivalent to maps produced using full power. The Air Force demonstrated the power management features during flight tests in August 1991. Results showed no discernable differences in image quality between power-managed and full-power radar maps during the tests.
- A matrix requirement for air vehicle performance included the completion of one lifetime durability test on a full-scale ground test article. The purpose of the test is to demonstrate durability of the airframe structure by

simulating flight and ground pressures on the aircraft structure. The B-2 specification requires durability to be tested for two simulated lifetimes, which is in accordance with overall military specifications and engineering standards for demonstrating the useful life of aircraft structures. The test of the first lifetime was completed in March 1991 without an indication of any major structural damage. The second lifetime of testing was completed on June 26, 1992. No major problems were identified with the aircraft structure according to the Air Force and the prime B-2 contractor, Northrop Corporation.

Aerodynamic and flight worthiness requirements are also included in the matrix. Requirements include evaluating and demonstrating flight characteristics and air vehicle flying qualities at different altitudes and speeds. Results are based on preliminary performance flight tests. Reports show the B-2 performance as being within 20 percent of predictions the Air Force made before results were demonstrated in flight. The Air Force believes this gives them a high confidence in meeting B-2 operational requirements. Performance testing for verifying full compliance with the specification is not scheduled to begin until mid-1993 and is scheduled to conclude in early 1996.

We also reviewed the Air Force's interim May 1992 flight test report on updating the navigation subsystem with the coherent map mode of the radar. The coherent map mode uses a synthetic aperture radar to make a picture map of terrain and cultural features on the ground. It is used for updating the aircraft position accuracy in the navigational subsystem and for bombing. It is one of the key modes of the radar. The report concludes that the radar mode functions properly when executing position updates to the navigation subsystem. Some problems with related functions were identified during these flight tests. Corrections will be made and validated during future tests. The full performance matrix shows that flight tests to fully demonstrate that the coherent map mode position update accuracy meets the navigation subsystem performance requirement will not be completed until fiscal year 1994. As of April 10, 1992, less than 50 percent of all flight test points for the coherent map mode were complete.

DOD Certification of Avionics Performance Will Not Be Based on B-2 Flight Tests

Many features of the offensive and defensive avionics systems will not be flight tested in a B-2 aircraft before DOD plans to issue its certification in response to the act. The act considers offensive and defensive avionics to be critical B-2 performance characteristics needed to be flight tested in order to demonstrate a high degree of confidence in mission

accomplishment. However, not all avionics integration software (software that allows the offensive and defensive avionics to interact with the appropriate subsystems that are to be used in operating the B-2 aircraft as an operational military aircraft) is planned to be delivered for flight testing by early-1993.

Integration software to incorporate all offensive avionics functions into the B-2 aircraft is not scheduled to be delivered to the flight test program until December 1993. For example, the radar is designed to perform various functions, known as radar modes, to carry out the B-2 missions. The B-2 radar has 19 of these modes (the coherent map mode was discussed previously). Integration software for the 5 most critical modes, according to the Air Force, was incorporated in B-2 test aircraft as of July 1992. Integration software for the remaining 14 modes is scheduled to be installed into the B-2 aircraft for testing in January 1993 (4 modes), August 1993 (7 modes), and December 1993 (3 modes). However, Air Force officials said the offensive avionics system has been tested on the flying test bed, which they believe supplements the partial B-2 flight testing and significantly reduces risks with deploying workable offensive avionics.

Similarly, integration software necessary to operate all functions of the defensive avionics is not planned to be installed in the B-2 aircraft until after the certifications for the act. Part of the integration software is scheduled to be installed in a development B-2 in January 1993 for flight testing. The remaining software is scheduled to be installed in two parts, one in August 1993 and one in September 1994. To reduce risks and identify problems early, a set of defensive avionics units was tested in the avionics integration laboratory at the Northrop Corporation. Those tests did not include some hardware items such as the cables and antennas used in the defensive avionics system on the B-2 aircraft. Unlike offensive avionics, Air Force officials noted that defensive avionics are not tested on the flying test bed because the performance of the defensive avionics is dependent on the configuration of the B-2 aircraft in which it is incorporated. Therefore, to demonstrate performance of the defensive system the officials said it is important to flight test the system with a full set of hardware and integrated software.

Air Force officials stated that the full testing of integrated avionics systems on a B-2 aircraft was never intended to be complete by early 1993. They said avionics development and testing is progressing in accordance with the full performance matrix provided to the Congress in August 1991. The Air Force believes that testing conducted in the laboratory and with the

flying test bed supplements B-2 flight testing and reduces the risk of incurring significant problems with the avionics.

We believe flight testing integrated offensive and defensive avionics on a B-2 aircraft is important because of the avionics and software integration problems encountered on other aircraft development programs. For example, the defensive avionics system on the B-1B bomber remains a problem even today after all production B-1Bs have been delivered. The B-2 program presents challenges different from prior aircraft development programs in that the avionics must not only be integrated into the aircraft system, but they must also operate within the requirements necessary to achieve the low observable features of the B-2. In addition, software development on the B-2 program has experienced significant delays. While the contractor has made improvements in software development, the Defense Science Board still considers software development as a critical item in the success of the B-2 program. Therefore, until offensive and defensive avionics, along with their associated antennas, receivers, transmitters, and other hardware have been integrated and flight tested on a B-2 aircraft, we believe high confidence in mission accomplishment, as specified in the act, cannot be fully demonstrated.

Status of Funding and Production Activity of the 16th Through 20th B-2 Aircraft

The Air Force has obligated over $1 billion of fiscal year 1992 and prior years procurement funds for continuing production activities on the 16th through 20th aircraft. This is termed "long lead" activity by the Air Force. The Air Force has not negotiated a firm contract for the delivery of these aircraft. Such a contract for the 16th aircraft cannot be signed until the Secretary of Defense submits the specified reports and certifications called for by the act and the Congress approves a subsequent act to confirm authorization of the aircraft. Table 3 shows the funds obligated for the 16th through 20th aircraft.

Table 3: Funds Obligated for the 16th Through 20th Aircraft, as of August 31, 1992

Fiscal year	Amount obligated	Purpose
1990	$ 314.8 million	aircraft 16-20 long lead
1991	$ 144.9 million	aircraft 16-20 long lead
1992	$ 104.2 million	aircraft 16 long lead
	$ 444.1 million	aircraft 17-20 long lead
Total	**$1,008.0 million**	

Aircraft 16 through 20 are in various stages of fabrication. The major sections that make up the aircraft structure have not yet been delivered to Northrop's final assembly plant, in Palmdale, California. The major sections are scheduled to be delivered from 1993 through 1996. For example, the aft center section of the 16th production aircraft is scheduled for delivery to the Palmdale facility in February 1993. It will be joined with the forward center section which begins the final assembly process for this aircraft.

Agency Comments

DOD generally agreed with our evaluation of the status and progress of B-2 testing and production. DOD believes that planned testing of offensive and defensive avionics by mid-1993 is sufficient to demonstrate a high degree of confidence in mission accomplishment even without flight testing on the B-2 aircraft. However, in light of the avionics and software integration problems encountered in other programs, such as the B-1B, we believe high confidence in mission accomplishment cannot be fully demonstrated without flight testing integrated offensive and defensive avionics on a B-2 aircraft.

Scope and Methodology

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

We performed our review from January 1992 to September 1992 in accordance with generally accepted government auditing standards.

We did not review most of the test documentation the Air Force is preparing to demonstrate that it has satisfied the requirements of the act. The Air Force is still accumulating that documentation. This documentation, along with results for demonstrations not yet completed, will be the subject of our future reviews and reports that are necessary to satisfy legislative requirements.

We are sending copies of this report to the Ranking Minority Members of your committees, other interested congressional committees, the Secretaries of Defense and the Air Force, and the Director of Office of Management and Budget. Copies will be made available to others upon request.

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

Nancy R. Kingsbury
Director
Air Force Issues

Agency Comments

OFFICE OF THE UNDER SECRETARY OF DEFENSE
WASHINGTON, DC 20301

ACQUISITION

September 25, 1992

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

Dear Mr. Conahan:

This is the Department of Defense (DoD) response to the General Accounting Office (GAO) draft report, "B-2 BOMBER: Status of Defense Compliance with the 1992 and 1993 Authorization Act," Dated September 2, 1992 (GAO Code 392679), OSD Case 9171. The DoD partially concurs with the report.

The Department generally agrees with the GAO observations concerning the status and progress of B-2 testing and production. The Department does not, however, agree that offensive and defensive avionics cannot be demonstrated with a high degree of confidence in mission accomplishment by mid-1993. Avionics development is progressing in accordance with the B-2 System Maturity Matrix. Avionics requirements have been met to date and are expected to be met in the future. With regard to the observation that "long lead" funding is occurring because the Air Force has not negotiated a firm contract for the aircraft, it should be noted that Congress has repeatedly authorized and appropriated funding for procurement, including advance procurement, for the B-2 program and DoD actions have been consistent with that funding.

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

George R. Schneiter
Director
Strategic and Space Systems

Enclosure

GAO DRAFT REPORT - DATED SEPTEMBER 2, 1992
(GAO CODE 392679) OSD CASE 9171

"B-2 BOMBER: STATUS OF DEFENSE COMPLIANCE WITH THE 1992 AND 1993 DEFENSE AUTHORIZATION ACT"

DEPARTMENT OF DEFENSE COMMENTS

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FINDINGS

Now on pp. 1 and 2.

- **FINDING A: Status of B-2 Test and Production Programs.** The GAO observed that the FY 1992 and FY 1993 Defense Authorization Act approved $2.8 billion for procurement of B-2 bombers--of which $1 billion was specifically earmarked for procurement of one new B-2 aircraft (the 16th of 20 operational B-2s) tentatively authorized for FY 1992. The GAO also reported that Section 131 of the Act requires that (1) certain performance capabilities be demonstrated before FY 1992 procurement funds are obligated for procurement of the 16th aircraft, (2) that the Secretary of Defense submit certain certifications and reports to the Congress, and (3) that a subsequent act be enacted before the Secretary is authorized to obligate funds for procurement of the B-2 aircraft. The GAO found that Section 131 was influenced by a Rand Corporation briefing to the Senate Armed Services Committee, which was sponsored by the DoD. The GAO observed that the Rand Corporation concluded the DoD could, by mid-1992, complete enough flight tests to provide high confidence that there are no performance problems so serious as to justify termination of the program. (p. 2/GAO Draft Report)

  DoD RESPONSE: Concur.

- **FINDING B: Progress of the Test Program Has Not Met Earlier Plans.** The GAO reported that, although funds for the B-2 development program have been authorized and appropriated as requested since 1981, the development program has been delayed and flight test hours have not accumulated as quickly as planned. The GAO observed that the July 1989 test plan was expected to take 54 months, but was extended to 86 months in the more current 1991 plan--which is based on 4,000 hours of flight testing. The GAO found, however, that as of July 22, 1992, the Air Force had flown only 667 hours, or 17 percent of the planned 4,000 hour flight test program. The GAO concluded that the factors contributing to

the test program delay are (1) test aircraft deliveries have not been completed on schedule, (2) diagnostics, analyses, and retesting have been required to resolve low observable problems, and (3) test aircraft have been delivered incomplete to the test force--making them unavailable for flight testing, while additional manufacturing work and design changes are completed. The GAO noted that the impact of delays from needed manufacturing work and design changes has been substantial, e.g., the 1991 plan reflected that the first aircraft would be unavailable for flight testing for 20 months, as compared to 6 months in 1989. The GAO acknowledged that, while the Air Force has had difficulty in flying planned test hours since July 1989, monthly test hours were significantly increased in April and May 1992--because test aircraft were more often available to fly and were not being modified or undergoing manufacturing type activities. The GAO also found that the aircraft experienced fewer problems and weather conditions did not shorten test missions as much as had occurred in the past. (pp. 4-5/GAO Draft Report)

Now on pp. 3 and 4.

DoD RESPONSE: Concur.

- **FINDING C: Delays in the Schedule for Meeting Certification Requirements.** The GAO reported that Section 131 of the Act prohibits the obligation of funds for procurement of B-2 aircraft authorized for FY 1992, until certain design characteristics were flight tested and demonstrated with high confidence. Based on discussions with Air Force officials the GAO concluded that, although some of the certifications have been completed, the earliest the Air Force could complete the remaining tests and demonstrations required by the Act is early 1993. (pp. 6-7/GAO Draft Report)

Now on pp. 4 and 5.

DoD RESPONSE: Concur.

- **FINDING D: Results of Completed Testing.** The GAO observed that the full performance matrix includes 25 requirements needed for the FY 1991 milestones in the areas of (1) mission performance, (2) low observables, (3) air vehicle performance, (4) integrated logistics support, (5) mission planning system, and (6) training system. The GAO found that many of the requirements included in the Act have been completed as of July 31, 1992, including the following:

  - the FY 1991 full performance matrix milestones;
  - identification of no aerodynamic or flight worthiness

problems before October 1991; and

- the ability to update the navigational system.

The GAO reviewed reports and analyses for selected 1991 milestones and found that full performance matrix requirements were, in fact, completed. For example, the GAO observed that navigation accuracy was successfully demonstrated on air vehicle 3 in September 1991. The GAO further observed that B-2 performance was within pre-flight predictions--thereby indicating the B-2 can meet operational requirements with high confidence. The GAO also observed that the radar power management tests found no discernible differences in image quality between power managed and full power radar maps. Finally, the GAO observed that the first lifetime test for structural integrity was completed in March 1991, without any indication of damage--with the second lifetime test scheduled to be completed in September 1992.

The GAO also reviewed the interim May 1992 test report on updating the navigation subsystem with the coherent map mode of the radar. The GAO found that, although some problems were identified during the tests, the radar mode functions properly when executing position updates to the navigation subsystem. The GAO noted, however, that navigation subsystem testing will not be completed until FY 1994--and that, as of April 10, 1992, less than 50 percent of the testing for the coherent map mode was complete. (pp. 7-10/ GAO Draft Report)

Now on pp. 6 and 7.

DoD RESPONSE: Concur.

- **FINDING E: Test Efforts Remaining for the Certification.** The GAO reported that the certification requirements will be handled in separate stages, and the Air Force is currently accumulating documentation to support the first stage. The GAO observed that one of the last requirements to be satisfied is certification of offensive and defensive avionics to provide a high degree of confidence in mission accomplishment. The GAO questioned the Air Force ability to demonstrate high confidence in offensive and defensive avionics by mid-1993 because critical avionics software is not scheduled for delivery to the test program until mid to late 1994. In particular, the GAO found that, of the 19 modes in the B-2 radar, software for only 5 modes was incorporated in test aircraft as of July 1992, and the remaining 14 modes will not be included until September 1993. The GAO also observed that the defensive avionics

Now on pp. 7-9.

will include only a portion of its planned capability until November 1994. (pp. 10-11/GAO Draft Report)

DoD RESPONSE: Partially concur. Completion of applicable System Maturity Matrix items for offensive and defensive avionics will support a certification by mid-1993 of both systems with a high confidence in mission accomplishment. Laboratory and inflight tests of hardware and software for both systems delivered to date have met program requirements and expectations. Similar performance is expected from future deliveries of offensive and defensive system hardware and software. Delivery of avionics software is planned over the life of the flight test program to support System Maturity Matrix milestones.

The five radar modes that are currently being tested on the B-2 aircraft are the five most critical for the aircraft to be able to perform its mission. The other 14 radar modes are scheduled for delivery and testing in accordance with System Maturity Matrix milestones. All will be tested and implemented prior to the Required Assets Available date. Air Combat Command participated in the development of the avionics specifications and is well aware of the maturity schedule for hardware and software deliveries.

- **FINDING F: Status of Funding and Production Activity of the 16th through 20th Operational B-2 Aircraft.** The GAO reported that the Air Force has obligated over $1 billion of FY 1992 and prior years procurement funds for continuing production activities on the 16th through 20th production aircraft. The GAO observed that the activity, called "long lead," is occurring because (1) the Air Force has not negotiated a firm contract for the aircraft, and (2) the Act restricts obligation of FY 1992 funds for procurement of the 16th aircraft until the Secretary of Defense submits specified reports and certifications on the B-2 performance. The GAO found that the required reports and certifications are not planned until mid-1993, with production aircraft 16 through 20 in various stages of fabrication. The GAO observed that the major sections which make up the aircraft structure are scheduled to be delivered to the final assembly plant in 1993. For example, the GAO noted that the aft center section of the 16th production aircraft is scheduled for delivery in February 1993, and must be joined with the forward center section--which begins the final assembly process. (pp. 11-12/GAO Draft Report)

Now on pp. 9 and 10.

DoD RESPONSE: Concur. The GAO is correct that activity, particularly at the major subcontractor facilities, is

ongoing in the absence of a definitive contract. Section 131 of the FY 1992 and 1993 National Defense Authorization Act provided $2.8 billion for "procurement, including advance procurement, for the B-2 bomber aircraft program." It allocated $1.0 billion of that amount for procurement of one new B-2 aircraft and restricted that expenditure, as pointed out by the GAO. The balance of the $2.8 billion is properly available for advance procurement. As noted, of the $1.0 billion expended on advance procurement of the 16th through 20th aircraft, only $548 million was from FY 1992 funds. Use of advance procurement funds, in accordance with Congressional direction, in no way runs counter to the Act's requirement for specified reports and certifications.

* * * * *

RECOMMENDATIONS

- **None.**

Major Contributors to This Report

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