United States General Accounting Office 132241

GAO

Testimony

For Release
on Delivery
Expected at
10:00 am
Wednesday
February 25, 1987

THE B-1B AIRCRAFT PROGRAM

Statement of
Frank C. Conahan
Assistant Comptroller General of the
United States

Before the
Committee on Armed Services
House of Representatives
Subcommittee on Research and Development and
Subcommittee on Procurement and Military
Nuclear Systems

GAO/T-NSIAD-87-4A

Mr. Chairmen and Members of the Subcommittees:

I am pleased to be here today to discuss cost, schedule, performance and logistics aspects of the B-1B aircraft program. I will also discuss restrictions placed on the B-1B as a result of current performance problems.

A classified version of this testimony was also provided to the Subcommittees.

BACKGROUND

When the decision to procure the B-1B was made in October 1981, an Initial Operational Capability (IOC) of October 1, 1986, was set. IOC was defined as delivery of the fifteenth aircraft to the Strategic Air Command with sufficient support resources to accommodate the Single Integrated Operational Plan (SIOP)[1] alert and SAC day-to-day operational flying requirements. The October 1986 date was considered achievable because of experience gained in the earlier B-1A program. It was recognized that achieving it would require a high degree of concurrency between development and production and, in fact, some development and production contracts were signed on the same day. The IOC date also compressed the test program due to the short period of time available for conducting

[1]In its SIOP role, the B-1B would be expected to be ready to carry out any assigned mission.

tests. Program costs were capped by the Congress, and the President certified in writing that the program could be completed within the estimate.

To date, over a third of 100 planned aircraft have been delivered. The first operational base, Dyess Air Force Base, has received all its aircraft, and Ellsworth Air Force Base, the second operational base, began receiving aircraft in January 1987. Production is scheduled to be completed with the delivery of the 100th B-1B in April 1988.

PERFORMANCE

Despite production delivery successes, the performance has been considerably less than originally intended. In preparation for deployment at Dyess, the Air Force Operational and Test Evaluation Center (AFOTEC) evaluated the B-1B's expected capability. The evaluation was based on data available as of July 1986. AFOTEC's September 1986 report discussed expected capabilities of the bomber and areas where it would have only limited capability. The Air Force test team reported the bomber would have limited operational effectiveness at IOC in areas such as navigation, terrain following, handling qualities, and defense systems. The team also reported that its weapons delivery and offensive systems would not have full capability at IOC. The

report listed a variety of performance problems, several of which remain today.

Developmental and production problems in B-1B subsystems have limited B-1B testing, necessitated operational restrictions, and prevented some operational training. While a lot of testing has taken place on the program, it is incomplete in many areas. Problems with the flight control system and terrain following radar prevented crew training in some areas. Similarly, development and production problems with the defensive avionics system have prevented testing of the full system.

Flight Controls

The B-1B is currently restricted from using its full flight capability at required gross weights and altitudes. Any aircraft has limits on its performance capability. Generally speaking, an aircraft becomes increasingly hard to handle and often will vibrate or wobble in flight as it approaches these limits. This warns the pilot, and action can be taken before control is lost. The B-1B does not vibrate or wobble as it approaches these limits; therefore artificial warnings have been installed to warn pilots not to operate beyond these limits.

To ensure safety, the B-1B alarm system warns pilots when they approach unsafe areas of the flight envelope. Pilots are

instructed to go no further. A second system phase, called the Stall Inhibitor System, is planned to allow the pilot to use almost all of the flight envelope and to preclude exceeding that limit. The final stage, called a Stability Enhancement Function, is planned to give the B-1B even greater capability. The Air Force plan is to allow use of the Stall Inhibitor System by June 1987, and the Stability Enhancement Function by June 1989.

Terrain Following Radar

Problems with the B-1B terrain following radar restricted its testing, and have prevented its use in crew training. The B-1B is intended to fly at low altitude over rolling terrain at night and in all weather at heavy gross weights. Problems with the radar computer software, however, have caused the terrain following system to read and react to false ground contours. Correction of these problems is underway, and permission is expected shortly to use terrain following at progressively lower altitudes.

We were told pilot personnel assigned to the B-1B alert forces have been given familiarization flights using the radar on the test range at Edwards Air Force Base, California.

Defensive Systems

B-1B effectiveness is further limited by the poor performance of the ALQ-161A defensive system, which is critical to the survivability of the aircraft. Development and production problems delayed delivery of system components, which in turn, delayed testing. Once components were available, testing identified many performance problems. To date, these problems are preventing operation of a complete defensive system for the B-1B.

The B-1B must survive in a threat environment that includes direct-kill weapons. This survivability is highly dependent upon the effectiveness of countermeasures against the weapons and guidance radars. The ALQ-161A defensive avionics system on the B-1B has many problems. The problems must be corrected before it will meet the contractually specified capability.

The Air Force has outlined a three phase plan to fix the ALQ-161A defensive avionics system, but completion of this plan is not scheduled for several years. The first phase, known as MOD 0 established a common configuration. This phase begins testing in March 1987. The common configuration will then go through two upgrades before meeting the contractual specification.

In early 1988, the Air Force plans to begin changing some circuit cards and software in the B-1B fleet to update the

defensive system to a MOD 1 configuration. This modification does not address all of the problems that need to be corrected to meet the contractual specification.

The retrofit of a MOD 2 will give the B-1B a defensive system that fully meets the contractual specification. Cost of this modification is estimated at $400 million and will take several years to complete.

The basic ALQ-161 has been around since the early days of the B-1A program. The development contract for the B-1A defensive avionics system was awarded to Airborne Instruments Laboratory (AIL) in January 1974. After the B-1A program was cancelled in 1977, development work continued under the Bomber Penetration Evaluation. When the bomber program was re-started in 1981 as the B-1B, the defensive system (now designated the ALQ-161A) was given additional radar bands to cover plus an integrated tail warning function. The full-scale development and production contracts were both signed in May 1982.

According to AIL officials, AIL had experience in developing electronic warfare systems, but had limited experience in high volume production, which was necessary for the B-1B program. AIL underestimated the complexity of designing and manufacturing the system, and development and production delays have been with the program since the beginning. This limited the availability of

hardware for testing. Production rates were low because AIL did not have adequate management resources and manufacturing facilities on-line early enough to meet the demand.

Much of the component testing of the system has been completed, but flight testing has identified many problems with the integrated system. According to the Air Force, the problems occur intermittently which increases the difficulty in pinpointing the causes.

Due to concurrent development and production, when a lot was due to start production, AIL stopped system design and used the most current component design for that production lot. Design then continued until the next production decision was due. As a result, production hardware lots were not all configured alike. This and changes and fixes that were put into the flight test program, meant that the systems under test did not represent what was being manufactured and installed in the fleet.

To more effectively deal with the problems at hand, in August 1986, the Air Force froze the configuration of the system then being produced and designated it as MOD 0. It was decided that MOD 0 would be thoroughly tested to determine its capability precisely. A 4-month test is scheduled to begin in March 1987.

Avionics Integration

Currently, B-1B offensive and defensive avionics interfere with each other. Correcting this problem requires development of a system to manage the radio frequency signals generated by the various components. This is a highly complex development effort that requires extensive testing. This testing began in June 1986 and will continue as avionics components become available. Until the complete defensive avionics system is available for test, it is not possible to reasonably estimate when this effort will be completed.

Fuel Leaks

The B-1B aircraft at Dyess are still experiencing fuel leaks. While this problem affects aircraft availability, it is basically a maintenance problem. Minor leaks do not restrict aircraft utilization; major ones require that aircraft be grounded until they are fixed, or that the aircraft fly with that tank empty. During the first week in January, 21 of 24 aircraft at Dyess AFB had fuel leaks. Three of these aircraft were temporarily grounded due to the leaks, and others had restrictions on certain tanks, or had temporary repairs to keep them flyable. While such leaks would not prevent use of the B-1B in the event of war, they do otherwise restrict the use of aircraft and limit operational crew training.

SCHEDULE

A significant portion of the B-1B combined development test and evaluation/initial operational test and evaluation (DT&E/IOT&E) is yet to be accomplished. DT&E/IOT&E has been extended by 32 months and is now planned to be completed by February 1989. This is 8 months after all B-1Bs are scheduled to be fielded.

The extended test schedule allows (1) no time to correct and retest major performance deficiencies that may occur and (2) little time for cancelled test flights and mission aborts caused by inclement weather or aircraft and instrumentation malfunctions. This schedule is highly optimistic. To date, for one reason or another, the B-1B has completed only 62 percent of its scheduled tests. The extended test schedule assumes 75 percent will be flown with no allowance for retest between now and February 1989. Therefore, future B-1B testing will have to be more successful than past B-1B testing.

The ability to fly low depends on successful testing of proposed fixes to the terrain following radar and the flight control problems. Under the current schedule, by August 1987 the terrain following radar will be available. While this will considerably improve current training capability, use of the fully responsive terrain following capability, under all conditions, must

await correction of the existing flight control problems, as discussed earlier.

LOGISTICS

Thirty-two B-1Bs have been delivered to Dyess Air Force Base. Ellsworth received its first aircraft in January 1987 and is scheduled to receive a total of 35 during the year. Major logistics and support problems have developed at Dyess. The lack of spare parts and inadequate repair instructions have already impacted on the availability of the current fleet. We were told that during a recent two week period, the Air Force reported 14 of the 25 aircraft at Dyess as not operational for some period of time. In the same two week period, four aircraft were cannibalized for parts to restore 10 of the 14 aircraft to an operational condition.

In October, an AFOTEC evaluation of the B-1B's central integrated test system (CITS) cited major problems and indicated that these problems are likely to continue throughout 1987. AFOTEC found that both the fault detection and isolation functions have performed poorly. The Test Center stated the immaturity of the CITS will not improve until late 1987.

Although new software has reduced the total number of false alarms in some aircraft, they still place an undue burden on

maintenance personnel. Dyess officials reported that recent data showed a decrease in false alarms from nearly 120 per aircraft sortie to around 80, depending on the software block on the individual aircraft. The most recent CITS software is experiencing a 71 percent false alarm rate, while aircraft with the older software are experiencing an 81-percent false alarm rate.

The low availability of operational aircraft has also reduced the Air Force's ability to train B-1B aircrews and reduced the planned number of alert aircraft. With four aircraft a month being delivered, and all four bases due to be operational by next year, these problems will likely continue to grow.

COST

GAO has not created any independent estimates of the B-1B system cost; the cost estimates cited below were obtained from the Air Force B-1B program office.

The B-1B baseline program is capped at $20.5 billion in fiscal year 1981 dollars. The program office calculates the cost to complete the baseline B-1B will be $20.4 billion in fiscal year 1981 dollars. This would be within the $20.5 billion base year dollar estimate certified by the President in 1981. In fiscal year 1986, the Congress reduced the original funding requirements by $1.3 billion. The estimate anticipates full restoration of the

fiscal year 1986 budget cuts. However, because current problems must be corrected and significant development and tests remain to be completed, there is no assurance the baseline program can be kept at or under current estimates.

The B-1B program office estimates that $28.1 billion (then year dollars) will be required to complete the baseline program. The current budget requests $802 million for the program in fiscal years 1988 and 1989. Of this, $600 million is needed principally to cover the extended flight test program, and represents a partial restoration of the fiscal year 1986 reduction. Program officials told us that restoration of the remaining cut from the fiscal year 1986 budget may be needed to fund contract overruns and new tasks and a fiscal year 1988 supplemental may be required to provide these funds.

The fiscal year 1988 and 1989 B-1B budget request of $802 million contains $200 million which represents the initial funding for three capability enhancements that the program office estimates will eventually cost over $1.5 billion. These enhancements and the current estimate of their total cost is as follows.

-- $665.3 million for a forward looking infrared radar to be used as backup to the offensive radar for terrain following, target acquisition, and navigation.

-- $787.6 million for addition of military standard 1760 common weapons interface necessary to enable the B-1B to carry the new SRAM-II missile.

-- $130.0 million to upgrade the ALQ-161A defensive avionics system to enable it to counter current hostile radar and missile threats.

In addition, other capabilities will have to be added to the B-1B if it is to be an effective penetrator through the 1990s. For example, the program office is currently defining a modification to the ALQ-161A to enhance countermeasures against some threat radars. The program office estimated the cost of this enhancement at $999 million. Other enhancements will be required to incorporate planned Air Force programs, such as communications systems (MILSTAR), navigation systems (GPS), nuclear safety devices, and classified weapons, currently under development. None of these programs has currently been formally added to the B-1B program, and are not included in program costs.

The B-1B Program Office currently estimates that increases in cost for two major B-1B contractors may require a fiscal year 1987 supplemental budget request for additional procurement dollars. Rockwell, the airframe contractor, anticipates its final cost will exceed its contract target price by about $500 million. The Air Force share of this would be about $400 million. The Program

Office is projecting that AIL, the defensive avionics system contractor, will require at least an additional $400 million from the Air Force. If available funds are not sufficient to cover these expenses, the Program Office intends to ask for restoration of all or part of the remaining from the fiscal year 1986 budget cut. Program officials told us they are currently attempting to more accurately define the impact of these overruns on the existing budget. They believe funds should be available within the current management reserve to fund at least part of these overruns.

MISSION EFFECTIVENESS

The current mission effectiveness of the B-1B is discussed in the classified version of this testimony.

LESSONS LEARNED

The initial ground rules of the B-1B program established a severe management challenge for the Air Force. The program included many unique factors, such as the early IOC, the congressional cost cap and presidential certification, the Air Force assuming responsibility for airframe and avionics integration, multiyear contracting, and the lack of some of the oversight normally available through milestone program reviews. These factors are interrelated and likely each has had some impact on current program problems. Our work, however, indicates that the

high degree of concurrency between development and production was a major contributor to all the present problems.

Air Force procurement regulations dictate generally that development, production, test, and deployment of a major weapon system be conducted sequentially. In order to field the B-1B in just 5 years from program start, however, these activities were conducted concurrently. While some concurrency is a fact of life in most weapons systems, we believe the degree of concurrency on this program was very high for a program of this size and complexity. Many of the problems being experienced today provide lessons about the risks concurrency poses for complex, high technology weapon system procurements.

In areas where significant changes were made from the B-1A, much of the redesign and development had to be conducted while production efforts were underway. Maintaining the production schedule, which was established to meet the IOC date, often meant that some components were based on an immature design. For example, the ALQ-161 design and development efforts were protracted and multiple versions of the same component were produced. As a result, multiple component designs were placed in early aircraft leading to variations in performance, maintenance difficulties, and testing with components whose design was already obsolete.

Concurrency also severely compressed the time available for developmental and operational testing, not allowing time for problem resolution. The Air Force Test and Evaluation Center, which was responsible for preparing a report on what capabilities the B-1B would have at initial deployment, stated that testing was largely yet to be accomplished at that time. They also said that many development problems had to be corrected before meaningful operational test data can be collected.

When concurrency cannot be avoided, it must be carefully managed to minimize its risks. Technically challenging development programs that advance the state-of-the-art, as is the case with the B-1B bomber, argue that development and tests be reasonably complete before production is started. Concurrency requires the constant introduction of hardware and software changes during production. The fast paced B-1B production schedule, which was driven by the need to meet an early IOC date, conflicted with the orderly completion of development, particularly the completion of system integration and flight test.

At this time, I would be happy to answer any questions you may have.