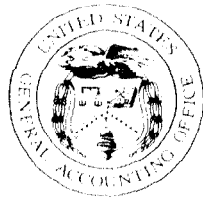


September 1991

# B-2 BOMBER

## Status of Subcontract Options



145051

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National Security and  
International Affairs Division

November 13, 1991

ERRATA

B-2 BOMBER  
Status of Subcontract Options

GAO/NSIAD-91-295  
September 24, 1991

This change to our report is necessary to recognize the impact of an error that was included in detailed subcontract data provided to us by the Northrop Corporation. The changes are as shown below.

The percentage on page 3, paragraph 2, line 2, should read 61 percent.

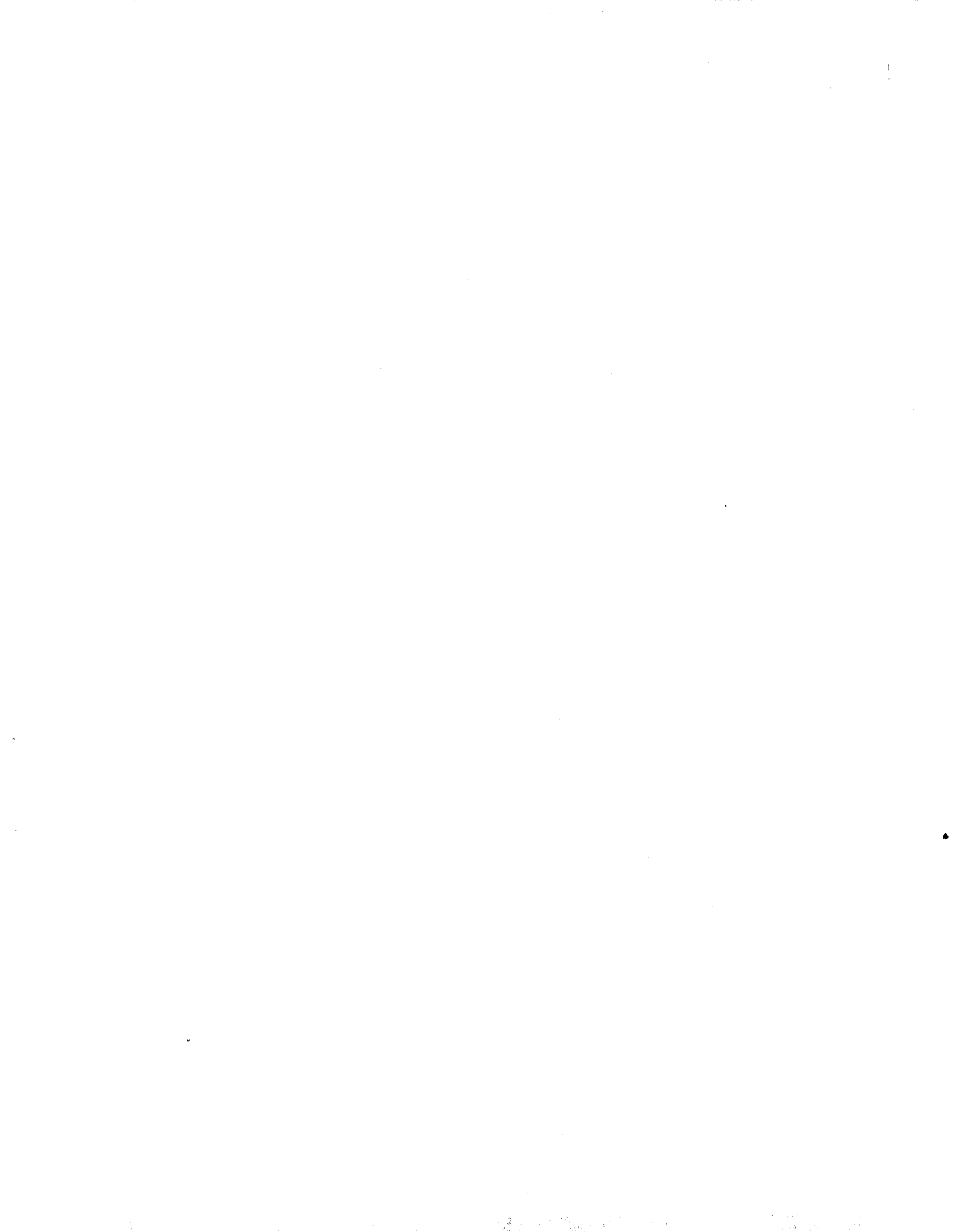
The first dollar amount and the percentage on page 12, paragraph 2, lines 4 and 5, and page 13, paragraph 2, line 5, should read \$193 million and 61 percent.

Table 2.2, page 13, should read as follows.  
(Dollars in thousands)

	Original negotiated <u>price</u>	Current estimated <u>price</u>	Dollar <u>increase</u>	Percent <u>increase</u>
1989 option	\$ 75,107	\$ 96,514	\$ 21,407	29
1990 option	70,960	116,568	45,608	64
1991 option	<u>47,322</u>	<u>99,126</u>	<u>51,804</u>	109
Total	<u>\$193,389</u>	<u>\$312,208</u>	<u>\$118,819</u>	61

The column heading for appendix I, page 16, should read "Average unit price." The dollar amount and percent increase for "Airframe mounted accessory drive" in line 23 should read \$326,538 and 89 percent.

  
Nancy R. Kingsbury  
Director  
Air Force Issues





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

National Security and  
International Affairs Division

B-244925

September 24, 1991

The Honorable Les Aspin  
Chairman  
The Honorable Ron Dellums  
Chairman, Subcommittee on Research and Development  
The Honorable John Kasich  
Ranking Minority Member, Subcommittee on Readiness  
Committee on Armed Services  
House of Representatives

The Honorable Tom Ridge  
The Honorable Jim Slattery  
The Honorable Mike Synar  
House of Representatives

This report discusses (1) the extent to which the prime contractor for the B-2 program had acquired components for aircraft that the Air Force does not plan to procure until after fiscal year 1991 and (2) increases to the estimated prices of the components. You also requested an evaluation of whether the Air Force had obligated sufficient funds to cover the government's liability reflected in special termination clauses in the development and production contracts with the prime contractor. A report on that evaluation is in process and will be issued separately.

As requested, we plan no further distribution of this report until 15 days after its issue date. At that time, we will send copies to appropriate congressional committees; the Secretaries of Defense and Air Force; the Director, Office of Management and Budget; and other interested parties.

Please contact me on (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

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# Executive Summary

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## Purpose

The B-2 is one of the most costly Department of Defense programs. Through fiscal year 1991, \$30.5 billion has been appropriated to develop and produce B-2 aircraft. The prime contractor on the B-2 contract, Northrop Corporation, has acquired components for installation in B-2 aircraft that the Air Force does not plan to procure for several years under options included in fixed-price subcontracts.

At the request of several members of Congress, GAO determined the extent to which (1) Northrop, using advance procurement funds provided by the Air Force, had acquired components for B-2s that the Air Force plans to procure in future years and (2) estimated prices for components being acquired under these options had increased.

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## Background

The Air Force and Northrop have two B-2 contracts. The first is a development contract signed in 1981. In addition, they agreed to contract terms for the first five production aircraft in 1987. Northrop, with Air Force approval, negotiated fixed-price subcontracts that included annual options for some components to be installed in B-2s. These options provide for minimum quantities of components that Northrop could purchase yearly or the options would expire. These options were to provide subcontractors the predictability necessary to lower their risk while providing economical quantities for production.

Since these subcontracts were established, the B-2 procurement schedule has been delayed, resulting in the Air Force ordering fewer aircraft from Northrop than anticipated at the time the subcontracts were awarded. Beginning in fiscal year 1989, aircraft orders fell below the minimum quantities of components that Northrop was required to order under the annual subcontract options. Northrop had to decide whether to exercise subcontract options or to let the options expire and negotiate new subcontracts for these items. Through fiscal year 1991, Northrop has exercised, with the knowledge of the Congress, most of the available subcontract options for minimum quantities of components.

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## Results in Brief

The Air Force and the Secretary of Defense approved Northrop's acquisition of components, under options to subcontracts, for installation in 17 more B-2s than the number the Air Force plans to acquire through fiscal year 1991. If B-2 aircraft and funds requested by the Air Force for fiscal year 1992 are approved by the Congress, and if available subcontract options are exercised by Northrop, components could be acquired in advance for installation in an additional 11 B-2s that the Air Force

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does not plan to procure until fiscal years 1995 and 1996. Further, prices of the options have increased due to changes in design of the components. Northrop has allowed the fiscal year 1991 options for seven of these subcontracted components to expire.

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## Principal Findings

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### Exercise of Subcontract Options

The Air Force has obligated \$341 million of the \$401 million of advance procurement funds authorized by the Congress for exercise of the subcontract options. The Air Force is requesting an additional \$220 million in advance procurement funds for fiscal year 1992 to provide funds for Northrop to exercise the next available options in the subcontracts and to cover the increases in liability associated with options exercised in prior years. Under the current Air Force procurement plan, exercise of available fixed-price options could result in the Air Force purchasing components for installation in 28 more aircraft than it plans to procure through fiscal year 1992.

Subcontracts with annual options negotiated between Northrop and subcontractors have increased in price by 64 percent since fiscal year 1989 primarily because the design of the components has changed. Air Force officials, however, stated that the acquisition of minimum quantities of components under annual options provided by the subcontracts is preferable to letting the options expire and negotiating new prices for the components. They said options were permitted to expire on seven components. New subcontract price estimates for these components, according to Northrop, are 150 percent higher than the prices that were available through exercising the options. Northrop must either negotiate new subcontracts or exercise existing annual subcontract options for components to be installed on aircraft that the Air Force does not plan to procure for several years.

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## Recommendations

GAO recommends that the Secretary of the Air Force make a comprehensive analysis of the alternatives to exercising the options for each of the 36 highest priced components. The Secretary should consider

- the risks of acquiring components with unstable designs,
- the revised schedules for delivery of aircraft,

- 
- the impact of inflation and the cost of financing the procurements ahead of the dates needed,
  - the cost of storing the components,
  - the potential obsolescence of the components, and
  - the potential expiration of subcontractor warranties and/or guaranties.

GAO believes the Secretary should complete the analysis for each component before fiscal year 1992 funds are obligated for that component on a contract with Northrop. Furthermore, the Secretary should provide a summary of the analyses with the Air Force's fiscal year 1993 budget request.

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## Agency Comments

GAO discussed this report with officials from the Air Force and Office of the Secretary of Defense. Those officials agreed that analyses of alternatives should be conducted prior to obligation of fiscal year 1992 funds for the subcontracts that represent the 36 components with the highest unit prices.





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# Introduction

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The B-2 bomber is a flying wing, four engine aircraft with two crew members and provisions for a third. It is intended to be a long-range, multirole bomber capable of penetrating Soviet air defenses at high and low altitudes. The B-2 program has been in the full-scale development stage since 1981. The first B-2 aircraft was delivered in November 1988, and its first flight occurred in July 1989. The second B-2 made its first flight in October 1990; the third B-2 was delivered in June 1991. These three B-2s were from the development effort.

Prior to April 1990, the Air Force had planned to buy 132 aircraft, with a peak production rate of 36 a year, for about \$70.2 billion. In April 1990, the Secretary of Defense completed a major aircraft review of the B-2 and several other aircraft acquisition programs. He concluded that the B-2's total costs and the changes in world conditions allowed the pace and quantity of the program to be reduced. As a result, he proposed buying a total of 75 aircraft, with a peak production rate of 16 a year by 1998. The 75 aircraft program is made up of 5 deployable development aircraft and 70 production aircraft. Also, the Secretary reduced the number of aircraft to be purchased in fiscal year 1991 from five to two. The revised estimate for the total cost of this program was \$61.1 billion.

In July 1990, Air Force officials advised the Congress that the Secretary of Defense's changes to the program and prior unfunded requirements were not fully reflected in the \$61.1 billion estimate. The Air Force's revised estimate, including the unfunded requirements and other adjustments, was \$62.8 billion. In January 1991, the estimate was increased to \$63.7 billion, reflecting an Air Force decision to extend production another year.

The estimated cost of the B-2 development program, through completion, is \$21.9 billion. Through fiscal year 1991, \$19 billion has been appropriated. Full-scale development began in 1981 under a cost-plus-incentive-fee contract with Northrop Corporation, the prime contractor, for six development aircraft, five of which will be refurbished and delivered to the Air Force for operational use. In addition, Northrop was responsible for building two structural test articles and tests and evaluation.

Concurrent with development efforts, the Air Force began low-rate initial production under a fixed-price-incentive-fee contract with Northrop in late 1987 to manufacture five production aircraft. In this contract, the government and Northrop agreed to share, in an 80 percent to 20

percent ratio, actual costs that are under or over a negotiated target cost, subject to a ceiling price equal to 135 percent of the target price. The initial target price for the five aircraft was \$2,271 million. Since then, the target price has increased to \$2,922 million.

A production contract for five additional B-2s authorized for fiscal years 1989 and 1990 had not been finalized as of August 1991, although the Air Force has provided continuous funding and had directed Northrop to begin working on those aircraft as early as fiscal year 1987. Currently, the Air Force and Northrop have only a preliminary agreement as to the terms, conditions, and prices for production of these aircraft. As of August 27, 1991, \$2,225 million had been obligated by the Air Force for the production of those five aircraft.

In accordance with the Defense Authorization Act of 1991, the Congress appropriated \$1.75 billion for development and \$2.35 billion for procurement. During consideration of the act, the House of Representatives approved a provision prohibiting the obligation of any more funds for the production of additional B-2s beyond the 10 production and 6 development aircraft previously authorized by the Congress. The Senate version of the act did not prohibit use of the funds to acquire additional aircraft, but it did specify numerous test milestones that would have to be accomplished before the Air Force could obligate the funds for new production aircraft. The final language of the act did not prohibit the use of funds to procure additional B-2s. The conference report highlighted the difference between the House of Representatives' and the Senate's versions. Air Force plans, however, indicate an intent to acquire 6 development and 10 production B-2 aircraft through fiscal year 1991.

The President's fiscal years 1992 and 1993 defense budget submitted to the Congress on February 4, 1991, requested four aircraft and \$4.8 billion in fiscal year 1992. The budget also requested seven aircraft and \$4.6 billion in fiscal year 1993.

## Fixed-Price Subcontracts and Options

To provide stable and economical production plans for subcontractors, the Congress occasionally provides the Air Force authority to contract for delivery of components for systems that the Congress has not yet authorized. Since fiscal year 1989, the Congress has authorized about \$401 million of advance procurement funds in the B-2 program for this purpose, and Northrop has negotiated fixed-price subcontracts providing for delivery of certain components to be installed in B-2s. A list of

the 36 most costly components is included in appendix I, along with the original and current average unit prices.

The subcontracts included options for future years based on an expected total procurement of 127 production aircraft on the program schedule in effect in fiscal year 1985. The fixed prices stated in the subcontracts could only be increased if the designs of the particular components were changed.

To recognize the possibility of delays in production or changes to schedules, Northrop and its subcontractors agreed that quantities to be procured under the annual options could be as low as 50 percent of the original quantities planned. Failure to exercise an annual option for at least the minimum quantity would result in expiration of future subcontract options.

The Air Force has obligated \$341 million of the \$401 million advance procurement funds made available through fiscal year 1991 for these subcontract options. Air Force officials told us the unobligated balance is required to cover the expected increase in termination liability from fiscal year 1990 options. The Air Force is requesting \$220 million in advance procurement funds in fiscal year 1992 to cover its termination liability associated with exercising the next options available (\$110 million) and to cover the increase in termination liability associated with fiscal year 1991 options (\$110 million).

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## Objective, Scope, and Methodology

During November 1990, several members of the Congress requested us to determine if the Air Force was giving first priority to funding the B-2 aircraft authorized by the Congress in prior years. In discussing the request with their representatives in April 1991, we agreed that the important contractual provisions involved in this issue were commitments to subcontractors by Northrop to deliver components for installation in more B-2s than the Air Force planned to procure through fiscal year 1991 and special termination clauses included in the Air Force's contracts with Northrop. Because a formal legal interpretation is necessary concerning funding of the special termination clauses, we agreed to report separately on that issue. Thus, our objective for this report was to determine the extent to which Northrop had acquired components under subcontracts for installation in B-2s, using advance procurement authority and funding. Our determination of the Air Force's financial liability under special termination clauses in the developmental and production contracts will be issued in a separate report.

To achieve our objective concerning subcontracts, we reviewed options for 36 components for fiscal years 1989, 1990, and 1991. We selected these components because Northrop identified them as major subcontracts on the program in terms of dollar value and they represented 90 percent of the price for all components that were being procured under subcontracts that included fixed-price options. We obtained information from records and officials and sampled information from subcontracts at the B-2 program office in Dayton, Ohio; Northrop Corporation in Pico Rivera, California; IBM Corporation in Binghamton, New York; and Unisys Corporation in Minneapolis, Minnesota.

We performed our review from December 1990 to June 1991 in accordance with generally accepted government auditing standards. As requested, we did not obtain written agency comments. However, we discussed a draft of this report with officials at the B-2 program office and the Office of the Secretary of Defense and incorporated their comments where appropriate.

# Exercise of Options Included in Subcontracts

Northrop is buying components for installation in B-2s from subcontractors under fixed-price subcontracts that provide options that can be exercised annually for future quantities at originally negotiated base prices. Prices are subject to adjustment if the designs of the components change. Minimum quantities of the components that would be purchased under the annual options were based on original B-2 order schedules. However, the Air Force is now buying fewer aircraft and at a slower rate than planned when the subcontracts were awarded. As a result, Northrop has purchased components for installation in 27 production B-2s, although the Air Force plans to procure only 10 production B-2s through fiscal year 1991.

Prices of these components have grown substantially, because design of the B-2 has changed as the development program progressed. The estimated prices of components ordered in option years between 1989 and 1991 have increased from about \$190 million to \$312 million, or 64 percent.

## Air Force Is Buying Components for Aircraft to Be Procured in Future Years

In 1985, Northrop planned to purchase sufficient numbers of components on a schedule that would provide components equal to the number of aircraft being ordered. As part of the agreements made with subcontractors, Northrop reserved the right to reduce the number of components ordered each year to 50 percent of the negotiated number. As the Air Force reduced and delayed orders for B-2 aircraft, components under fixed-price subcontracts still had to be purchased in these minimum yearly quantities or the options would expire. Because the number of aircraft being ordered on a yearly basis has dropped below minimum yearly quantities for these components, Northrop is buying aircraft components that the Air Force does not plan to procure for several years (see table 2.1).



**Table 2.1: Number of Components Under Option and Production Aircraft Authorized by the Congress**

Fiscal year	Cumulative components under option	Cumulative B-2 orders proposed by the Air Force	Difference
1988/prior	5	5	0
1989	10	8	2
1990	18	10	8
1991	27	10	17
1992	42	14	28
1993	60	21	39
1994	70	28	42
1995	70	39	31
1996	70	50	20
1997	70	61	9
1998	70	70	0

As indicated by the table, through fiscal year 1991, Northrop has purchased components through the 27th production B-2, while only 10 production B-2s have been ordered. This results in components being ordered for 17 more B-2s than currently planned to be procured through fiscal year 1991. Under the current schedule, the aircraft for which components could be acquired in fiscal year 1992 are not scheduled to be procured by the Air Force until fiscal years 1995 and 1996.

## Prices of Components Have Increased

As the prime contractor, Northrop has established 169 firm, fixed-price subcontracts with yearly options for components to be installed on B-2 aircraft. As shown in table 2.2, our review of 36 components with the highest prices purchased from 1989 to 1991 shows that the prices have increased from about \$190 million to about \$312 million, or 64 percent, mostly as a result of B-2 design changes.

**Table 2.2: Planned and Actual Option Prices for Selected Components<sup>a</sup>**

Dollars in thousands

	Original negotiated price	Current estimated price	Dollar increase	Percent increase
1989 option	\$73,872	\$96,514	\$22,642	31
1990 option	69,008	116,568	47,560	69
1991 option	47,322	99,126	51,804	109
<b>Total</b>	<b>\$190,202</b>	<b>\$312,208</b>	<b>\$122,006</b>	<b>64</b>

<sup>a</sup>This table compares prices only of options that have been exercised. The fiscal year 1991 options for seven components were not exercised.

The prices for these components, however, do not reflect costs of additional work that has not been negotiated, nor do they include Northrop's overhead, indirect costs, general and administrative costs, or profit. Were these costs to be included, the current prices would be higher. For example, the current unit price under option I to Northrop for a classified subsystem is \$5.2 million, while the expected final price to the Air Force is \$11.4 million, or 119 percent higher than the subcontractors' price to Northrop.

Northrop officials attribute most of the price increases for these components to changes to B-2 design, which have required altering the components. For example, Northrop has directed four changes to the design of the avionics control unit. As a result, the cost of this component rose by 10 percent in 1989, and agreement has not yet been reached as to its price in fiscal years 1990 and 1991. According to Northrop officials, each time the design changes, the subcontractor can renegotiate the unit price based on increased work.

Northrop officials told us they did not exercise annual subcontract options for 7 of the 36 components in 1991 because funding was not available. They anticipate the price of each component to increase 150 percent when a new subcontract is negotiated. Northrop's overall price estimate for all seven components also has increased 150 percent, from \$18 million to \$44.8 million. In one case, in March 1991, Northrop officials reported that they expected the estimated price for nine aircraft mounted accessory drives, which control the hydraulics on the B-2, to increase by \$8.8 million if a new subcontract were negotiated, from \$5.9 million under the previously negotiated contract to \$14.7 million, or 150 percent.

## Conclusion and Recommendation

Subcontracts for the B-2 have experienced significant cost growth to date. In addition, several of the options scheduled to be exercised in 1991 have been allowed to expire for lack of funding, and the Air Force believes they will likely cost more once new subcontracts are negotiated. Because Northrop agreed to annual minimum quantities when negotiating these subcontracts, these components must be purchased on a yearly basis or the subcontract options will expire. As a result, if the B-2 program were terminated now, the government would own components for 17 more aircraft than the Air Force plans to procure through fiscal year 1991.

The continued exercise of annual subcontract options is resulting in procurement of aircraft components that are not planned to be authorized for several years. Accordingly, we recommend that the Secretary of the Air Force make a comprehensive analysis of the alternatives to exercising the options for each of the 36 components listed in appendix I. The Secretary should consider

- the risks of acquiring components with unstable designs,
- the revised schedules for delivery of aircraft,
- the impact of inflation and the cost of financing the procurements ahead of the dates needed,
- the cost of storing the components,
- the potential obsolescence of the components, and
- the potential expiration of subcontractor warranties and/or guaranties.

We believe the Secretary should complete the analysis for each component before fiscal year 1992 funds are obligated for that component on a contract with Northrop. Furthermore, the Secretary should provide a summary of the analyses with the Air Force's fiscal year 1993 budget request.

# Original and Current Unit Prices of 36 Components Being Purchased by Northrop Corporation Under Fixed-Price Subcontracts With Annual Options

Components	Average current price		Percent increase
	Original	Current	
Classified subsystem	\$2,667,682	\$6,212,364	133
Avionics control unit	2,596,000	2,847,000	10
Electronic flight control set	868,043	792,217	-9
Auxiliary power unit system	743,783	828,217	11
Rack integrated interconnecting system	545,000	555,000	2
Multi-purpose display set	539,348	561,087	4
Conditioned air systems	403,000	902,714	124
Power control unit	347,087	405,087	17
Alternate current electrical power system	346,955	490,182	41
Altitude motion sensor set	234,857	585,857	149
Proximity switch logic unit	198,318	304,091	53
Receiver/transmitter group	183,692	183,692	0
UHF/VHF radio set	150,571	185,571	23
Fire warning and leak detection system	150,455	129,545	-14
Engine thrust control system	134,231	137,923	3
Status monitor remote terminal	134,000	150,000	12
High frequency radio set	123,571	139,000	12
Ethylene glycol water system	98,591	102,818	4
Mass storage unit	95,714	96,143	0
Hydraulic reservoir	89,087	190,043	113
Air turbine starter system	89,000	89,455	1
Hydraulic pump	83,087	320,217	285
Airframe mounted accessory drive	81,385	616,615	658
Passive thermal protection system	69,364	73,909	7
Intercommunication set	51,087	60,565	19
Flight data recorder	43,591	47,682	9
KU-X band transponder	42,043	165,652	294
Liquid cooling system	40,500	45,045	11
Manual fuel control panel	39,348	72,478	84
Tactical air navigation radio set	36,826	39,957	9
Instrument landing set	36,000	29,000	-19
Standby flight instrument set	24,136	30,000	24
Engine performance monitor	22,261	22,261	0
Transponder set identify friend/foe	16,783	160,130	854
On board maintenance printer	10,182	10,182	0
Glideslope antenna	5,000	5,000	0

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# Major Contributors to This Report

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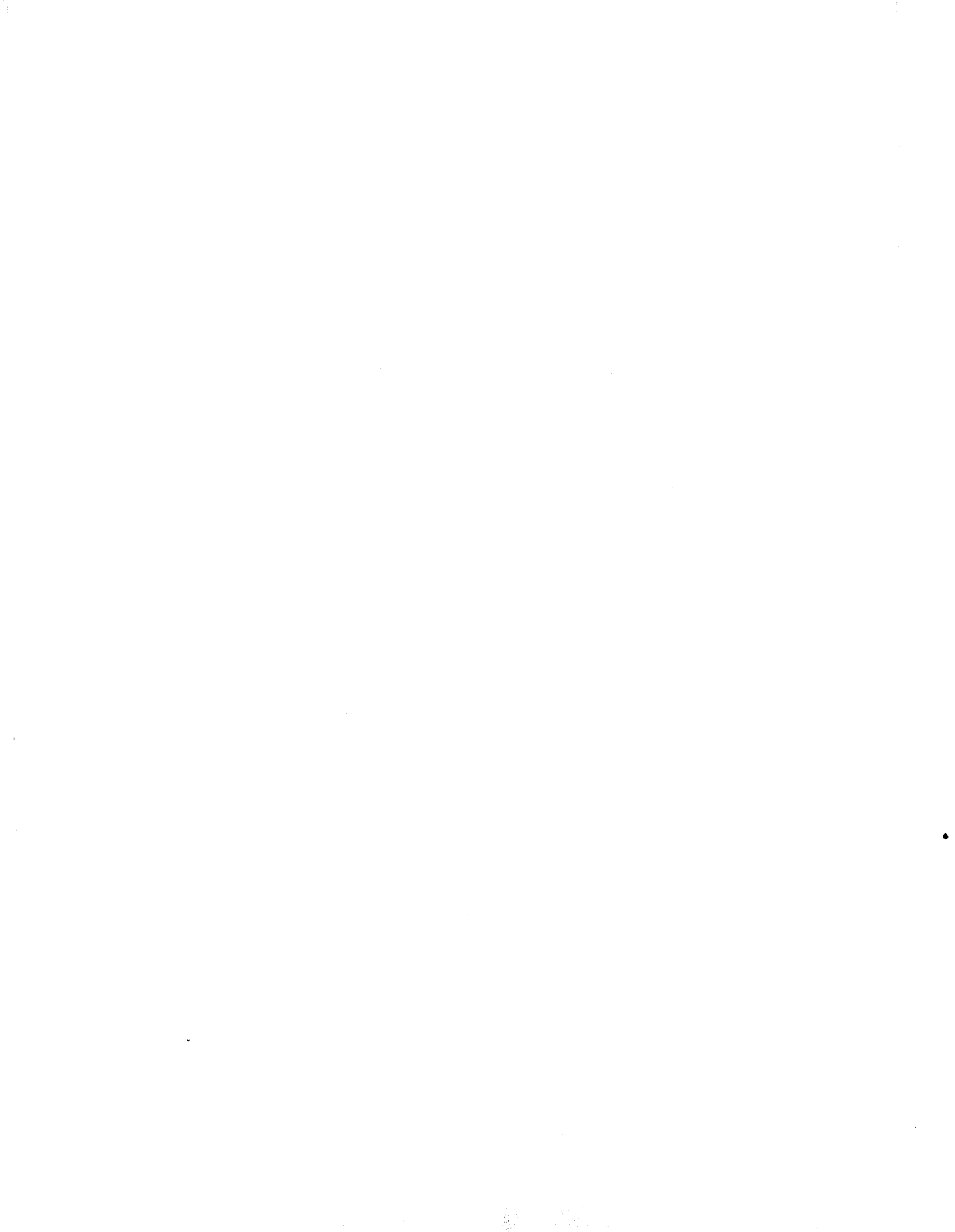
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