

United States General Accounting Office

GAO

Report to the Chairman, Subcommittee on
Defense, Committee on Appropriations,
House of Representatives

February 1986

PROCUREMENT

An Assessment of the Air Force's F-16 Aircraft Multiyear Contract



034594





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

National Security and International
Affairs Division

B-215925

February 20, 1986

The Honorable Joseph P. Addabbo
Chairman, Subcommittee on Defense
Committee on Appropriations
House of Representatives

Dear Mr. Chairman:

At your request, we reviewed the Air Force's F-16 multiyear contract for fiscal years 1982 to 1985. We assessed potential savings from using a multiyear contract instead of a series of annual contracts, the effect of foreign military sales on multiyear contract prices, the effect of aircraft the Congress added to the fiscal year 1984 budget on multiyear contract prices, and other benefits of using multiyear contracting. The substance of our report was provided to your staff in a briefing on the preliminary findings of our review.

The results of our review are summarized below, and the details are discussed in appendixes I and II. Appendix III discusses the objectives, scope, and methodology we used to analyze the F-16 multiyear contract.

Congressional Approval

The Congress approved the F-16 single engine, lightweight fighter for multiyear procurement in the fiscal year 1982 Defense Appropriations Act. When the Air Force formally proposed buying the F-16s under a multiyear contract, over 500 had been delivered to the Air Force and foreign customers. Foreign countries also planned to procure 146 aircraft during the multiyear procurement period. In fiscal year 1984, the Congress added 24 F-16s to the Department of Defense's request. In the justification submitted to the Congress in October 1981, the Air Force estimated that a multiyear contract for 480 aircraft over the 4-year period would cost \$246 million less (in then-year¹ dollars), or 7.7 percent, than a series of four annual contracts for 120 aircraft per year. The 4-year contract, negotiated between the Air Force and General Dynamics, was to procure 480 F-16 airframes and certain related equipment, but would not include engines and most avionics. The airframe represents about one-third of an F-16's total cost.

¹Then-year dollars, to account for the expected effects of inflation, show the total amount of money needed to buy goods at some future time.

Savings

There are no comparable multiyear and annual cost estimates available for us to confirm whether the \$246 million in total then-year dollar savings estimated by the Air Force in its October 1981 justification package were achieved. Only the original proposal submitted in March 1981 by General Dynamics, which showed potential savings of \$325.8 million in then-year dollars, had comparable multiyear and annual cost estimates available for us to review. After the original proposal was submitted in March 1981 and before the multiyear contract was finally negotiated in March 1983, several changes took place causing the savings estimates, including the October 1981 estimate showing \$246 million in savings, to become outdated. These changes revised the estimates for inflation projections and foreign sales of F-16s,² and airframe improvements were added. While General Dynamics' multiyear proposals were updated and adjusted to reflect those changes, the proposal for annual contracts was not. Without comparable updates and adjustments to annual savings, confirmation of savings cannot be accomplished.

Although we could not determine if total savings projected by the Air Force were achieved, we found evidence that savings were achieved in at least one area. Subsystem purchase orders were awarded in a manner that permitted an evaluation of purchase order prices on both an annual and multiyear basis. We evaluated General Dynamics' purchases of subsystems to determine if savings were achieved by ordering those subsystems in economic quantities (multiyear), compared with annual procurements. Because similar data was not available for any other categories of expenditures, we could not evaluate whether other savings were achieved.

In its original March 1981 proposal, General Dynamics indicated that the largest category of its \$325.8 million estimated savings would come from subsystem purchases, such as landing gears. Of the total estimate savings from subsystem purchases (\$148.9 million in then-year dollars), General Dynamics indicated that the bulk (\$87.3 million in then-year dollars) would result from purchases from subcontractors. The \$87.3 million savings equates to \$29.8 million in 1980 dollars. By reviewing a subsystem purchase orders, which were priced in 1980 dollars, our objective was to determine if General Dynamics saved an amount roughly equal to \$29.8 million.

²Foreign sales, expected at the time the Congress approved the multiyear contract, were finalized and included in the negotiations.

Based on a review of purchase order price arrangements, our calculations showed that the subsystem purchase order prices were \$30.6 million (in 1980 dollars) less than the prices for annual purchase orders. About \$16.4 million of the multiyear savings was attributed to subsystems purchased to fulfill Air Force requirements of 480 aircraft. The other \$14.2 million multiyear savings was achieved by combining subsystem quantities to fill foreign sales orders for aircraft with the quantities purchased to fill Air Force needs.

The Air Force had received multiyear approval in fiscal year 1982 and had provided General Dynamics funds to make economic order quantity purchases based on an Air Force buy of 480 aircraft, for fiscal years 1982-85. The additional 24 aircraft added in fiscal year 1984 were purchased as a separate lot from the multiyear quantities. To anticipate the possibility of such additions, the negotiated multiyear contract contained a variation-in-quantity clause with prices established for aircraft added at a later time. The Air Force simply exercised its options to purchase the 24 added aircraft. The unit price of those 24 aircraft were 7.5 percent more than the unit price of 480 aircraft included in the multiyear buy.

Additional Benefits

The Air Force did not discuss other benefits in addition to cost savings in its justification package submitted to the Congress in October 1981. This type of data was not required at that time. We discussed other potential benefits with General Dynamics and F-16 program officials and sent questionnaires to nine General Dynamics' subcontractors. These officials said other multiyear contract benefits could be realized, such as increased capital investment and stable production schedules. However, they only provided us with testimonial evidence and not with any documentation that would support their beliefs.

Conclusion

Data does not exist for us to validate the overall cost savings achieved through use of a multiyear contract; but it appears that savings attributed to the largest category of savings, subsystem procurement, can be achieved. Foreign military sales contributed to these savings while additional aircraft added by the Congress had no effect on savings. The Air Force, contractor, and subcontractor officials believe a multiyear contract also provides additional benefits which are not easily measured.

Agency Comments

We did not obtain official comments on our report, but we did discuss the results of our review with officials from the F-16 program office, General Dynamics, Fort Worth Division, and the Office of the Secretary of Defense. Their views were included where appropriate.

We are sending copies of this report to the Chairmen, House Committee on Government Operations, Senate Committee on Governmental Affairs, and the House and Senate Committees on Appropriations and Armed Services. Copies are also being sent to the Secretaries of Defense and the Air Force.

Sincerely yours,



Frank C. Conahan
Director

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Analysis of F-16 Multiyear Contract

We were requested on March 8, 1984, by the Chairman of the Subcommittee on Defense, House Committee on Appropriations, to analyze the F-16 multiyear contract. The Chairman requested that we analyze the multiyear savings to the government, the effects of foreign military sales on multiyear contract prices, the effects of aircraft added by the Congress in the fiscal year 1984 budget on multiyear contract prices, and other benefits of the multiyear contract.

Description of the F-16 Multiyear Contract

The F-16 multimission fighter (Fighting Falcon) is a single engine, light-weight aircraft being procured by the Air Force and certain foreign countries for air-to-air combat and delivery of air-to-surface weapons. By October 1981, when the Air Force formally proposed buying F-16s under a multiyear contract, over 500 F-16s had been delivered to the Air Force and foreign customers.

The fiscal year 1982 Defense Appropriations Act (December 1981) approved the use of a multiyear contract to procure 480 F-16s during fiscal years 1982 through 1985. This contract between the Air Force and General Dynamics, Fort Worth Division, has a target price of over \$2.6 billion. The multiyear contract covers the procurement of F-16 airframes and certain related equipment, but excluded engines and most avionics. The airframe represents about one-third of the total F-16 cost.

Projected F-16 Multiyear Contract Savings

In March 1981, General Dynamics submitted alternative proposals to the Air Force on an annual and a multiyear basis covering the purchase of 480 F-16 airframes and certain related equipment. The multiyear proposal assumed an Air Force commitment to acquire 480 F-16s over 4 years (fiscal years 1982-85) under a single contract. The annual proposals assumed procurement of 120 F-16s per year to be acquired under 4 separate annual contracts. The proposal for a multiyear contract was \$325.8 million (then-year dollars), less expensive than the proposal for series of four annual contracts. Prices proposed by General Dynamics are affected by the quantities of foreign sales involved. By combining procurement of subsystems for the Air Force and foreign governments, both can achieve lower prices for subsystems, and consequently, a lower overall contract price.

The Air Force adjusted the General Dynamics' proposals to add the effects of planned improvements and support equipment. The adjustments affected both the multiyear and annual prices and increased the estimated savings to \$350 million.

Before submitting the F-16 multiyear justification package to the Congress, F-16 officials again recomputed the savings estimate based on the inflation rate assumption recommended by the Office of Management and Budget (approximately 7 percent compared to 9 percent assumed by General Dynamics). The annual and multiyear proposals were adjusted based on these rates and estimated multiyear contract savings were lowered from \$350 million to \$246 million. The \$246 million savings was the amount shown in the Air Force's multiyear justification package submitted to the Congress in October 1981.

The savings estimates were also revised after the Congress approved the use of a multiyear contract for the F-16 program. The estimates are shown in table I.1.

Table I.1: Air Force Estimate Based on Contractor Proposal With Additions

Millions of then-year dollars

Type of estimate	Estimate date	Estimate by contract type			Savings percentage of estimated annual cost
		Annual	Multiyear	Savings	
Original contractor proposal	Mar. 1981	\$2,897.6	\$2,571.8	\$325.8	11.2
Air Force estimate based on contractor proposal with additions	Mar. 1981	3,336.0	2,986.0	350.0	10.5
Multiyear justification package with additions and lower inflation assumptions	Oct. 1981	3,184.0	2,938.0	246.0	7.7
FY 1983 budget	Feb. 1982	3,353.9	3,094.4	259.5	7.7
FY 1984 budget	Jan. 1983	2,892.3	2,635.5	256.8	8.9

Present Value Analysis of Multiyear Savings

The timing of government expenditures differ for annual and multiyear procurement methods. Present value analysis must be used to compare the annual and multiyear estimates to account for the time value of money.

Although present value analysis is a generally accepted practice, selecting an appropriate interest rate is crucial. For federal government investment analyses and decisionmaking, arguments for interest rates range from the use of the cost of borrowing by the U.S. Treasury to rates of return earned in the private sector. Since most government funding requirements are met by the Treasury, we believe that its estimated cost to borrow money is a reasonable basis for establishing the interest rate for present value analysis. Accordingly, we used the

average yield on outstanding marketable Treasury obligations with remaining maturities similar to the period involved in the analysis.

The Air Force's F-16 multiyear justification package, submitted in October 1981, showed multiyear savings of \$246 million. The package, however, did not include a present value analysis. Since the October 1981 package did not include present value analysis, we used the latest savings estimate prepared by the Air Force in January 1983. This estimate showed multiyear savings of \$256.8 million, or 8.9 percent, and was accompanied by an analysis showing expected outlay patterns for annual and multiyear contracts.

Our present value analysis of the January 1983 estimate shows projected savings to the government of \$170.4 million, or 7.2 percent. A comparison of Air Force multiyear savings and our present value analysis is presented in table I.2.

Table I.2: Comparison of Air Force Multiyear Savings and Our Present Value Analysis

	Estimated cost by contract method		Estimated savings with multiyear contract	Percent saving
	Annual	Multiyear		
Air Force estimate	\$2,892.3	\$2,635.5	\$256.8	8.9
Present value analysis	2,363.8	2,193.4	170.4	7.2

The percentage of savings for the F-16 is reduced by a present value analysis, but that is expected because under present value analysis, future dollar amounts are smaller when discounted. The fact that the difference is only 1.7 percent (8.9 - 7.2) is an indication that savings were not affected to a large enough degree to cause concern about the validity of multiyear contracting for the F-16.¹

Data Unavailable for Analysis of the Total Contract Savings

We were unable to verify whether the total projected contract savings were achieved. Following approval of multiyear procurement for the F-16 in December 1981, no further annual proposals were requested or received by the Air Force. Revised proposals and updates and negotiations were completed only for a multiyear contract. Consequently, the

¹The starting date used in the present value calculations was January 1983 because that was the date when the Air Force multiyear savings estimate was prepared. If the starting date was the beginning of fiscal year 1981, the year the expenditures began, savings would be reduced slightly more.

is no comparable annual negotiated figure to compare with the multi-year contract target price.

In March 1981, General Dynamics submitted proposals to procure 480 airframes and associated equipment on an annual and a multiyear basis. Once the Congress approved the multiyear approach, the Air Force requested an updated proposal on a multiyear basis only. In addition, the updated proposal was prepared on a different basis than the March 1981 proposals which prohibits a direct comparison between them. Examples of these differences include:

- The updated proposal assumed 300 airframes would be C and D models as opposed to the March 1981 proposals which assumed that all 480 airframes would be A and B models.
- The updated proposal assumed all airframes would be coproduced with four European countries, whereas the March 1981 proposals assumed only 45 airframes would be coproduced.
- The mix between contractor and government-furnished equipment changed.
- The number of foreign military sales aircraft increased.

To test the achievement of savings on a more limited basis, we evaluated the prices for major subsystems acquired by General Dynamics.

**Limited Analysis of
 Estimated Savings Related
 to Subsystem Procurement**

The largest category of savings for the F-16 multiyear contract was expected to involve more economical procurement by General Dynamics of subsystems, such as landing gears. The sources of the estimated savings, as identified by the Air Force, are shown in table I.3.

Table I.3: Sources of Estimated Savings

Millions of then-year dollars	
	Amount of savings
Subsystems procurement	\$149
General material procurement	114
Manufacturing	58
Support equipment procurement	19
Engineering	10
Total	\$350

Under a multiyear arrangement, General Dynamics expected to procure subsystems more economically on a multiyear basis than is possible with

a series of annual procurements. The technique is called economic order quantity procurement or expanded advance buy. Rather than procuring subsystems in annual lots of limited size (e.g., 120 landing gears each year), General Dynamics could procure the subsystems in larger lots (e.g., 480 landing gears plus foreign quantities in 1 purchase order), thereby obtaining lower prices.

Since we could not confirm total contract savings, we examined whether General Dynamics achieved anticipated savings from purchases of subsystems from subcontractors. Because the source of the \$325.8 million savings was not categorized in the General Dynamics' justification package, we used the Air Force's justification. While the Air Force's justification categorized the estimated savings, it also showed savings of \$350 million. The Air Force's estimated savings are higher because it reflects savings from aircraft improvements and support equipment not included in the General Dynamics' estimate.

The buildup of figures leading to the estimated total subsystem savings of \$149 million (table I.4) shows that the Air Force expected \$87.3 million of the savings to be achieved by General Dynamics procuring subsystems in economic order quantities under a multiyear arrangement. The \$87.3 million in then-year dollars is equivalent to \$29.8 million when stated in constant, uninflated January 1980 dollars.

Table I.4: Subsystem Savings

Current Dollars	
Category	Estimated amount of total subsystem savings between multiyear and annual contract
Subsystems procurement	\$ 87,299.21
Procurement overhead	18,863.69
Product liability	165.52
General and administrative expenses	18,901.05
Cost of money	856.83
Total cost savings	126,086.32
Profit savings	17,652.05
Total price savings	143,738.42
Estimated savings for planned airframe improvements	5,200.00
Total subsystems savings	\$148,938.42

^aAir Force's estimate shows this is equivalent to \$29.8 million when expressed in constant January 1980 dollars.

General Dynamics' purchase orders with its subsystem suppliers generally quote a base price in January 1980 dollars to purchase a quantity of 1 through 2,250 units and contain formulas to calculate price discounts and premiums depending on the quantity ordered and rate of delivery.

Based on these purchase orders, we estimated the savings actually achieved as a result of multiyear contracting with foreign military sales included. Our savings estimates and methodology are discussed in more detail in appendix II. The highlights of our analysis are discussed in the following section.

Effect of Multiyear

Our calculations show that the multiyear estimated purchase order prices are \$30.6 million (in January 1980 dollars) less than the estimated annual contract prices would have been as shown in table I.5. Appendix II shows the methodology we used to compute these contract prices.

**Table I.5: Annual and Multiyear
Estimated Contract Prices**

Dollars in Millions	
	January 1980
Estimated annual contract price	\$410.9
Estimated multiyear contract price	380.3
Difference	\$ 30.6

General Dynamics' price to purchase subsystems is approximately \$30.6 million (in January 1980 dollars) less expensive, which is comparable to the \$29.8 million in January 1980 dollars shown in the Air Force's original savings estimate. Despite the changes which took place between the Air Force's original savings estimate and the updated multiyear proposal, substantial savings in subsystem procurement appear to be achievable.

Effect of Foreign Military Sales

General Dynamics purchased subsystems in quantities to cover both Air Force and foreign military sales requirements. During the F-16 multiyear contract period (fiscal years 1982-85), three countries—Egypt, Pakistan, and Venezuela—procured 104 F-16 aircraft under the United States' foreign military sales program. The Netherlands, one of the

European coproducers² of the F-16, also procured 42 aircraft. The requirements of these four countries (146 airframes) were combined with the Air Force's requirements (480 airframes). Prices were proposed by General Dynamics and evaluated and negotiated by the Air Force concurrently for the total requirement of 626 F-16 airframes. The price for 626 airframes was then separated into 480 for the Air Force and 146 for the four countries, and two separate contracts were signed. Our calculations show that because of foreign military sales, the Air Force realized \$14.2 million of the estimated multiyear savings (\$30.6 million in January 1980 dollars).

Table I.6: Estimated Multiyear Savings Due to Foreign Military Sales

Dollars in Millions	
	January 1980
Estimated multiyear contract price without foreign military sales	\$394.5
Multiyear contract price with foreign military sales	380.3
Difference	\$ 14.2

Impact of Additional Aircraft

The fiscal year 1984 Defense Appropriations Act added 24 aircraft to the Department of Defense's request for F-16s. We found that the additional aircraft had no effect on the Air Force's multiyear savings estimate. The estimate was based on an Air Force buy of 480 F-16s and no savings were attributed to any additional quantities. In January 1982, based on its approved multiyear program, the Air Force provided General Dynamics funds to procure economic order quantities to cover fiscal years 1982 through 1985 requirements (480 aircraft). The multiyear contract which became effective July 1983, included a variation in quantity clause, providing negotiated prices for 20 to 85 additional airframes in both fiscal years 1984 and 1985. Once the fiscal year 1984 Appropriations Act became law, the Air Force simply exercised its option to increase the quantity at the contractually established price.

The unit prices of the added airframes were 7.5 percent higher than the unit prices for the 480 airframes procured under the multiyear contract. The average unit prices for fiscal year 1984 quantities are shown in table I.7.

²Four European countries—Belgium, the Netherlands, Denmark, and Norway—have coproduced and procured F-16s.

Table I.7: Average Unit Price

Dollars in Millions	
	Unit Price
24 airframes	\$5.7
Multiyear	5.3
Difference	\$0.4
Percentage difference	7.5

**Other Benefits
 Associated With
 Multiyear Contracts**

Besides cost savings, other benefits such as broadening the defense industrial base are expected to result from multiyear contracting. The multiyear justification package submitted to the Congress in October 1981 did not identify such benefits. The following sections discuss the additional benefits cited by the F-16 program and the General Dynamics officials as well as major F-16 subcontractors. It should be noted that they provided only testimonial evidence and no documentation to support their beliefs.

**Other Multiyear Benefits
 Cited by General Dynamics**

General Dynamics officials cited four benefits associated with the F-16 multiyear contract: (1) more incentive to invest capital in new technology and modern equipment because of the long-term nature of a multiyear contract and industry desire to reduce manufacturing costs, (2) protection against materials and parts lead-time increases, (3) more competitive in international sales, and (4) additional surge production output potential.

**Other Multiyear Benefits
 Cited by Major
 Subcontractors**

In addition to obtaining the prime contractors' views on multiyear contracts, we sent a questionnaire to nine United States subcontractors of General Dynamics to obtain their views. Their contracts represent about 63 percent of the total subsystem procurement value. The benefits they cited are summarized in table I.8.

**Appendix I
Analysis of F-16 Multiyear Contract**

Table I.8: Other Multiyear Benefits

Multiyear benefit	Number who responded	
	Yes	No
Lower procurement cost	9	0
Increased capital investment	8	1
Stable production schedule ^a	8	0
Retention of qualified, experienced staff to provide on the job training	7	2
Increased surge capability	9	0

^aOne subcontractor was unsure.

An additional benefit was cited by one respondent—less administrative burden.

**Other Multiyear Benefits
Cited by F-16 Officials**

F-16 officials cited several benefits derived from a multiyear contract such as enhanced investment, less training, and lower administrative costs.

Our Calculations of Multiyear Savings Attributed to Subsystem Procurement

The following describes our methodology and the results of our calculations which show multiyear savings derived from subsystem procurement.

Methodology

The F-16 multiyear contract includes 46 major subsystem purchase orders which are individually priced. The purchase orders generally quote a base price to purchase a quantity of 1 through 2,250 units and contain formulas to calculate price discounts and premiums, depending on the quantity ordered and rate of delivery. Table II.1 illustrates typical quantity and delivery rate variance factors used in the pricing formulas.

Table II.1: Quantity and Delivery Variance Factors Used in Pricing Formulas

Quantity variances		Delivery rate variance	
Quantity	Percentages	Rate/Month	Percentages
20-29	+9.0	6-7	+7.8
30-49	+6.7	8-10	0
50-69	+2.2	11-14	-6.8
70-120	0	15-18	-10.8
121-200	-1.4	19-23	-12.5
201-350	-4.0	24-28	-14.6
351-550	-5.0	29-35	-16.1
551-800	-5.8		

A (+) represents a premium and a (-) represents a discount.

We reviewed the purchase orders for 44 of the 46 major subsystems and determined the prices paid.¹ The purchase orders include quantities to meet both U.S. Air Force and foreign military sales requirements. Using the same methodology as General Dynamics' pricing analysts used to calculate the purchase order price, we calculated a price without foreign military sales requirements. We then calculated the price assuming four annual contracts.

We coordinated our work with the contractor's pricing analysts to ensure that the methodology we used was comparable to that used in calculating the multiyear price which included the benefits resulting from the various foreign military sales.

¹Because comparable data for two subsystems were not readily available, we excluded them from our analysis. The estimated price for these two subsystems is about \$11 million of the \$149 million; therefore, we believe that excluding them would not substantially change the results of our analysis.

Appendix II
Our Calculations of Multiyear Savings
Attributed to Subsystem Procurement

Our calculation of the prices of the 44 major subsystems purchased by General Dynamics for the F-16 showed the multiyear contract resulted in an estimated multiyear savings of \$30.6 million. Of this, \$14.2 million was attributed to foreign military sales and \$16.4 million was savings from the multiyear contract compared to annual buy contracts.

Table II.2 shows the calculated prices of the various subsystems and the estimated savings.

**Appendix II
Our Calculations of Multiyear Savings
Attributed to Subsystem Procurement**

Table II.2: Purchase Order Prices to General Dynamics for the Air Force's 480 Aircraft

January 1980 dollars

System	Price under Annual buy w/o FMS^a	Price under MYC^b w/o FMS	Price under MYC with FMS	Multiyear Savings w/o FMS	Multiyear Savings with FMS	Total combined savings
Accelerometer	\$ 1,932,976	\$ 1,750,304	\$ 1,708,053	\$ 182,672	\$ 42,251	\$ 224,923
Multifunction display	24,685,430	22,545,500	22,545,500	2,139,930	0	2,139,930
Channel freq. indicator	745,580	617,287	473,217	128,293	144,070	272,363
Aux. comm. panel	507,222	466,038	466,038	41,184	0	41,184
Interference blanker	2,711,362	2,540,728	2,450,772	170,634	89,956	260,590
D-3 computer	27,917,388	27,163,196	27,163,196	754,192	0	754,192
Fire control computer	10,565,189	9,941,853	9,079,752	623,336	862,101	1,485,437
Flight control computer	17,481,714	16,852,975	16,675,027	628,739	177,948	806,687
Stick force sensor	4,255,705	3,989,705	3,886,200	266,000	103,505	369,505
Data transfer unit	5,320,875	4,769,674	4,769,674	551,201	0	551,201
Data entry display	8,130,052	7,203,532	7,203,532	926,520	0	926,520
Heads up display	13,481,360	12,863,030	11,406,268	618,330	1,456,762	2,075,092
Ice detector	674,465	659,025	648,200	15,440	10,825	26,265
Pneumatic sensor	3,090,378	2,976,299	2,894,129	114,079	82,170	196,249
Inverter	4,088,089	3,897,892	3,617,215	190,197	280,677	470,874
Converter regulator	1,696,200	1,637,700	1,535,643	58,500	102,057	160,557
Radar altimeter antenna	333,109	311,994	309,021	21,115	2,973	24,088
Rate sensor unit	3,768,949	3,734,260	3,660,303	34,689	73,957	108,646
Radar electro optic. unit	5,110,498	5,110,498	5,110,498	0	0	0
Radar electro optic. unit	2,557,340	2,557,340	2,385,820	0	171,520	171,520
Radome	5,190,934	5,157,234	4,831,980	33,700	325,254	358,954
300 gallon tanks	4,243,149	4,147,318	3,966,248	95,831	181,070	276,901
370 gallon tanks	2,170,601	2,101,224	1,972,897	69,377	128,327	197,704
Electronic component assy.	2,952,455	2,800,518	2,583,710	151,937	216,808	368,745
Flight control panel	1,363,195	1,289,775	1,188,587	73,420	101,188	174,608
Manual trim panel	687,735	654,021	610,725	33,714	43,296	77,010
Stores management set	7,030,536	6,960,786	4,547,320	69,750	2,413,466	2,483,216
Stores management set	7,444,924	7,444,924	7,444,924	0	0	0
Ammo handling system	27,649,884	26,287,775	25,114,235	1,362,109	1,173,540	2,535,649
Antiskid system	4,377,305	4,235,589	3,942,403	141,716	293,186	434,902
Constant speed drive	12,118,246	11,893,180	11,613,764	225,066	279,416	504,482
Engine start system	39,030,769	38,091,920	37,046,231	938,849	1,045,689	1,984,538
Fuel flow proportioner	2,368,715	2,270,222	2,155,227	98,493	114,995	213,488
Emergency power unit	15,391,775	14,687,420	14,431,270	704,355	256,150	960,505
Leading edge flap drive	23,682,227	23,160,745	22,519,266	521,482	641,479	1,162,961
Fuel sty mea. sys/probes	4,273,895	4,174,942	4,067,973	98,953	106,969	205,922
40 KVA generator	972,072	972,072	913,221	0	58,851	58,851

Appendix II
Our Calculations of Multiyear Savings
Attributed to Subsystem Procurement

System	Price under Annual buy w/o FMS^a	Price under MYC^b w/o FMS	Price under MYC with FMS	Multiyear Savings w/o FMS	Multiyear Savings with FMS	Total combined savings
Rate gyro	6,856,204	6,839,212	6,657,067	16,992	182,145	199,137
Integrated servo actuator	50,965,913	49,841,951	48,937,432	1,123,962	904,519	2,028,481
Landing gears	38,479,319	35,565,408	34,477,427	2,913,911	1,087,981	4,001,892
Primary/secondary heat exchanger	7,343,018	7,230,536	6,585,446	112,482	645,090	757,572
Regenerative heat exchanger	1,565,283	1,552,512	1,347,879	12,771	204,633	217,404
Turbine compressor	4,457,575	4,457,575	4,291,112	0	166,463	166,463
Speed brake actuator	1,265,954	1,124,020	1,059,219	141,934	64,801	206,735
TOTAL	\$410,935,564	\$394,529,709	\$380,293,621	\$16,405,855	\$14,236,088	\$30,641,943

^aForeign military sales.

^bMultiyear contract

Objectives, Scope, and Methodology

Our objectives were to (1) analyze the claimed benefits/savings to the government and (2) review the effects on the multiyear contract, if any, of foreign military sales and additional aircraft added by the Congress to the Department of Defense's fiscal year 1984 budget request.

Our work was performed from May 1984 through September 1984, primarily at General Dynamics' Fort Worth Division, Fort Worth, Texas, and the Air Force's F-16 Program Office, Wright-Patterson Air Force Base, Ohio. We reviewed the multiyear contract; the contractor's multiyear and annual price proposals, cost data, and procurement records; and the Air Force's cost data and procurement records. We interviewed contractor and F-16 program officials as well as Defense officials who are knowledgeable about the F-16 multiyear contract. We also interviewed officials and reviewed documents prepared by officials at the Pricing Directorate, Aeronautical Systems Division, and Defense Contract Audit Agency, Fort Worth, Texas.

To test the accuracy and reasonableness of the Air Force's savings estimate contained in its justification package, we traced the estimate to contractor proposal data and verified the Air Force's calculations which showed \$246 million in savings. Once the Congress approved a multiyear contract, the Air Force requested and received only a multiyear proposal. In addition, the assumptions used to prepare this proposal differed from the contractor's original proposal. Therefore, we could not verify actual savings. As discussed in appendix II, we did perform a limited analysis involving General Dynamics' purchase of subsystems to identify the effect of a multiyear contract and foreign military sales.

We also performed a present value analysis on the Air Force's savings estimates. This analysis was made to determine the net savings to the government after accounting for the time value of money. By using present value techniques, we converted future dollar amounts into their values at the present time. Although present value analysis is a generally accepted practice, selecting an appropriate interest rate has been the subject of much controversy. For federal government investment analyses and decisionmaking, arguments have been presented for interest rates ranging from the cost of borrowing by the Treasury to rates of return that can be earned in the private sector. Since the Treasury meets most government funding requirements, we have maintained that its estimated cost to borrow is a reasonable basis for the interest rate used in present value analysis. Accordingly, for our analysis, we used the average yield on outstanding marketable Treasury obligations that had remaining maturities similar to the time period involved in our

**Appendix III
Objectives, Scope, and Methodology**

analysis. The interest rates and corresponding present value factor we used for our present value analysis are shown in table III.1.

Table III.1: Data Used for Present Value Analysis

Fiscal years	Interest rate	Present value factor^a
1981	10.8	1.1977
1982	16.07	1.1255
1983	9.7	1.0121 & .9649
1984	9.7	.8900
1985	9.7	.8113
1986	9.7	.7396
1987	9.7	.6742
1988	9.7	.6146
1989	9.7	.5602

^aMid-period discounting was used in our present value analysis. As previously noted, January 1983 was our starting date because that was the date when the Air Force multiyear savings estimate was prepared. Therefore, for fiscal year 1983 the expenditures for the first quarter were compounded and the remaining quarters were discounted.

Table III.2 shows the expenditure profiles for the Air Force's January 1983 multiyear savings estimate and the present value of this estimate using the factors shown in table III.1.

Table III.2: Present Value Analysis of F-16 Negotiated Multiyear Buy and Air Force Estimate of Annual Buy

Dollars in Millions			
Fiscal years	Air Force's January 1983 estimate		
	Annual	Multiyear	Savings
1981	\$ 4.8	\$ 4.8	\$ 0
1982	68.5	83.4	-14.9
1983	329.2	418.3	-89.1
1984	571.8	548.2	23.6
1985	861.5	727.0	134.5
1986	700.8	564.1	136.7
1987	267.0	221.6	45.4
1988	65.7	50.4	15.3
1989	23.0	17.7	5.3
Total	\$2,892.3	\$2,635.5	\$256.8

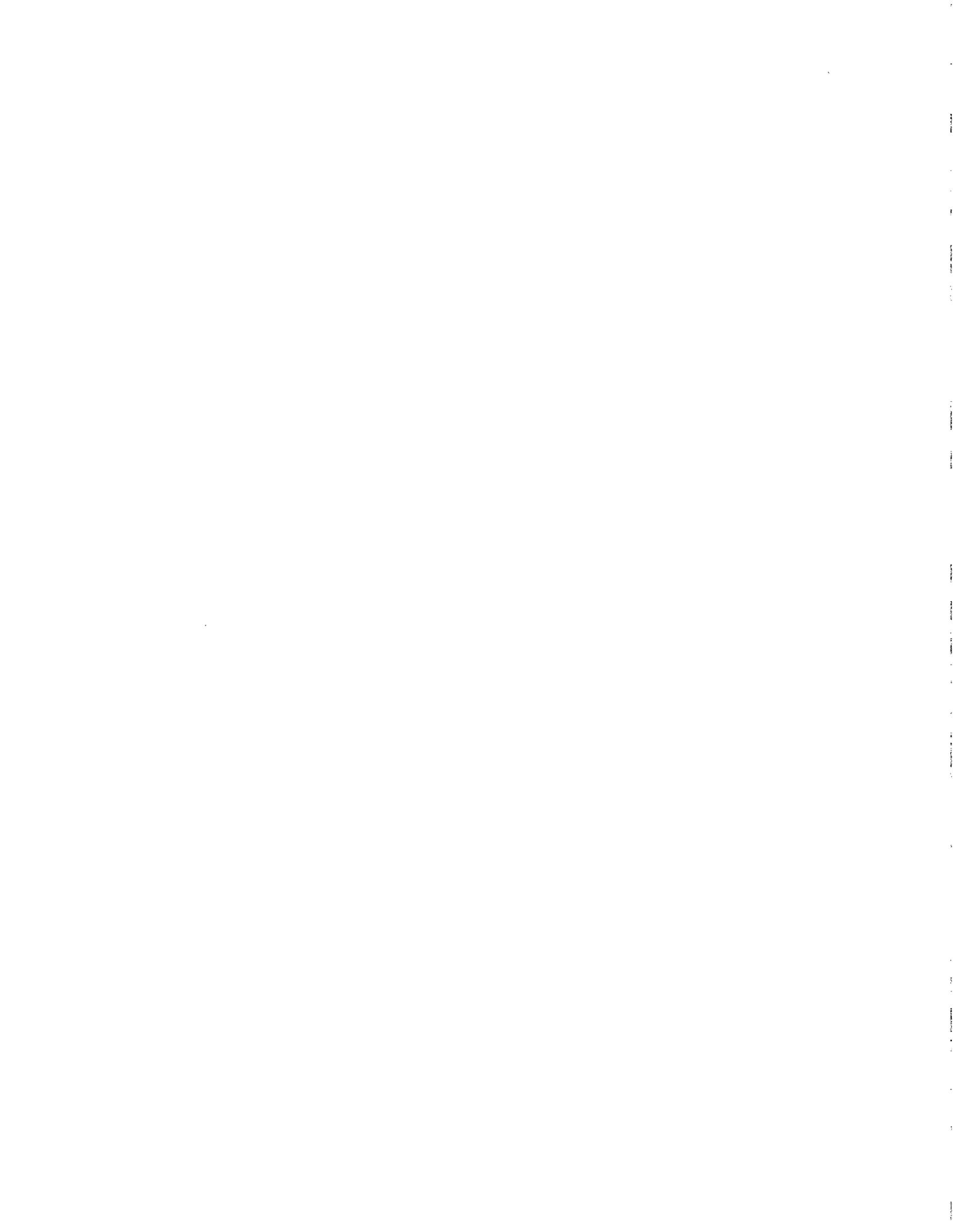
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Fiscal years	Present Value Dollars		
	Annual	Multiyear	Savings
1981	\$ 5.8	\$ 5.8	\$ 0
1982	77.1	93.9	-16.8
1983	321.5	408.5	-87.0
1984	508.9	487.9	21.0
1985	698.9	589.8	109.1
1986	518.3	417.2	101.1
1987	180.0	149.4	30.6
1988	40.4	31.0	9.4
1989	12.9	9.9	3.0
Total	\$2,363.8	\$2,193.4	\$170.4

Under contracts taking longer than a year to complete, Treasury regulations allow contractors to use the completed contract method for federal income taxes and defer payments of taxes on profits until the year of completion. Corporations electing to use this method will obtain a greater deferral of tax payments than otherwise available and, consequently, less overall corporate tax revenues flow to the federal government.

The task of computing the tax implications was not feasible during this audit. The tax implications were not determined because it was impractical to obtain all required data for the prime contractor and 44 major subcontractors.

Our review was performed in accordance with generally accepted government auditing standards.



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