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Report to the Chairman, Supreme Audit Institution Conference on [illegible] Matters

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Report to the Chairman, Supreme Audit Institution Conference on F-16 Matters

May 1990

F-16 PROGRAM

Reasonably Competitive Premiums for European Coproduction

GAO/NSIAD-90-181

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

National Security and
International Affairs Division

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May 14, 1990

Mrs. Dr. Saskia Stuiveling
Chairman, Supreme Audit Institution
Conference on F-16 Matters
Algemene Rekenkamer
2500 EA 's-Gravenhage
The Netherlands

Dear Mrs. Stuiveling:

In response to your request at the June 1989 Supreme Audit Institution Conference on F-16 Matters in Brussels, Belgium, we reviewed the procedures used by General Dynamics Corporation to calculate reasonably competitive premiums for the F-16 Multinational Fighter Program. The Supreme Audit Institutions want to ensure that their respective governments pay the proper price for goods delivered and services rendered under this program. The premiums are used by General Dynamics to determine whether subcontract proposals involving European companies are reasonably competitive. As agreed at the conference, we reviewed General Dynamics' premium calculations, including the exchange rates that were used to convert European currencies to U.S. dollars, for three F-16 components that have been coproduced by European companies to determine whether the calculations were reasonable and accurate.

Results in Brief

Our review of reasonably competitive premiums for three aircraft components demonstrated that, overall, General Dynamics used reasonable methods, suitable data, and accurate computations in setting the premiums for those components. We did not identify anything in General Dynamics' calculations that overstated premium values or prevented European subcontract proposals from being reasonably competitive.

The production hours, labor rates, support costs, domestic and European purchase order values, cost estimating methodology, and other factors General Dynamics used to calculate the three premiums we reviewed were supported by adequate documentation. In addition, we found that General Dynamics used the correct currency exchange rates to compute the three premiums. The procedures used by General Dynamics to establish the reasonably competitive premiums and the

related reasonably competitive coproduced prices and reasonably competitive purchase order values for the F-16 Multinational Fighter Program are described in appendix I.

Background

Under the F-16 Multinational Fighter Program, four European countries—Belgium, Denmark, the Netherlands, and Norway—joined with the U.S. government in purchasing the first 998 F-16 aircraft under prime contracts awarded to General Dynamics. The program to purchase these aircraft is known as the 998 program. As a part of that program, the U.S. government agreed that a portion of future manufacturing activity for third country F-16 sales would be awarded to companies or coproducers in the four European countries, provided their offers were reasonably competitive with offers from U.S. (domestic) companies. The premiums were calculated by General Dynamics and approved by the U.S. Air Force F-16 System Program Office to establish a basis for awarding reasonably competitive production subcontracts for F-16 components to the European coproducers.

General Dynamics established premiums for 51 aircraft components (airframe parts, avionics and mechanical systems, and program management) for the F-16 program. The premiums were developed in 1982 based on a study of the costs of manufacturing and assembling aircraft for the 998 program. Some of the premiums were revised in 1983 because of changing aircraft configurations and corrections made to certain details in the analyses of production tasks.

For each F-16 component coproduced by European companies, General Dynamics applies the premium from the 998 program to the domestic unit price for follow-on production to set a reasonably competitive coproduced price. A reasonably competitive purchase order value is computed from this price to evaluate subcontract proposals involving European companies. Proposals that are equal to or less than the reasonably competitive purchase order value can be agreed to by General Dynamics as part of normal contract negotiations. If, however, a proposal exceeds this value, General Dynamics must notify the F-16 System Program Office, which makes the final determination whether coproducers meet reasonably competitive criteria.

Scope and Methodology

We used three factors to select the aircraft components and premiums to review. First, we selected high-dollar components; second, we selected components coproduced by companies from different European participating countries; and third, we included both airframe parts and a mechanical system. We selected two airframe parts—the aft and center fuselages—which are coproduced in Belgium and the Netherlands, respectively. In addition, we selected a mechanical system—the ammo handling system—which was coproduced in Norway.

Because the premiums continue to be used in making reasonably competitive subcontracting decisions for current F-16 production for sales to third countries, they are considered to be competition sensitive by the U.S. Air Force and General Dynamics. Accordingly, we are not disclosing premium values and the data used to compute them.

Although we cannot disclose specific values for the three 998 program premium calculations we reviewed, we replicated each step of the calculation for each premium. In addition, we reviewed the application of the premiums for the initial follow-on production program (Multiyear I). We examined General Dynamics' working papers supporting the premium calculations and, where possible, verified the data used in the calculations by tracing them to official company records or U.S. government documents. If official company records were no longer available, we used alternate procedures to ensure that the data were suitable for the premium calculations. A detailed description of the factors and calculations General Dynamics used for each premium is shown in appendix II, and the documentation we reviewed is shown in appendix III.

To conduct our work, we met with officials of the General Dynamics Corporation, Fort Worth Division, Texas; the Defense Contract Audit Agency, General Dynamics/Fort Worth; and the U.S. Air Force F-16 System Program Office, Wright-Patterson Air Force Base, Ohio. We conducted our review from December 1989 to May 1990 in accordance with generally accepted government auditing standards. We provided a draft of this report to officials from General Dynamics and the F-16 System Program Office, and they agreed that the report is accurate and contains no competition sensitive information that would limit its distribution.

We will not distribute this report until 30 days after its issue date. At that time we will send copies to appropriate congressional committees; the Secretary of the U.S. Air Force; General Dynamics; and the Director, U.S. Office of Management and Budget.

Please contact me at (202) 275-4268 if you have any questions concerning this report. Other major contributors to this report are listed in appendix IV.

Sincerely yours,

Nancy R. Kingsbury

Nancy R. Kingsbury
Director
Air Force Issues

Procedures Used by General Dynamics to Establish Reasonably Competitive Premiums for the F-16 Multinational Fighter Program

Under the 1975 "Memorandum of Understanding Between the U.S. Government and the Governments of Belgium, Denmark, the Netherlands, and Norway, Relating to the Production and Procurement of F-16 Aircraft," companies in the four European countries participated in producing the initial 998 F-16 aircraft. In addition, on the condition that reasonably competitive terms were offered in accordance with the memorandum of understanding, the U.S. government agreed to place 15 percent of the procurement value of all follow-on third country purchases of the F-16 aircraft with companies in the four European countries.

The 998 program covered fiscal years 1977 through 1982. Follow-on production took place primarily under Multiyear Contracts I and II, which covered calendar years 1982 through 1985 and 1986 through 1989, respectively. General Dynamics placed European subcontracts for the 998 aircraft within an agreed framework of a not-to-exceed price per aircraft. Consequently, those subcontracts were considered to be reasonably competitive by definition. However, the need to further define the program requirement that European subcontracts be reasonably competitive arose during negotiations for the follow-on contracts (U.S. Air Force and third country).

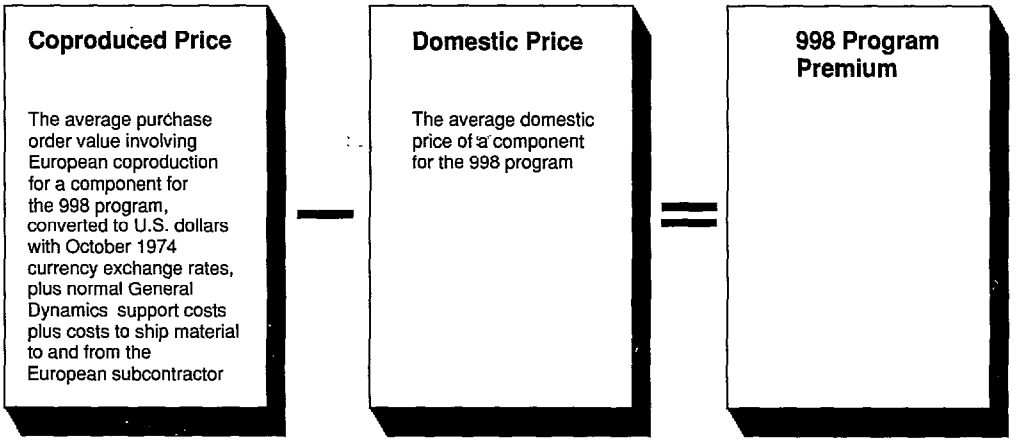
The F-16 System Program Office considered several approaches to making a reasonably competitive determination and decided to adopt the approach of establishing a reasonably competitive premium over the domestic price for each component coproduced by European companies during the 998 program. The premium plus the current domestic price served as the reasonably competitive coproduced price to be used in the evaluation of subcontract proposals for follow-on production.

General Dynamics computes a reasonably competitive purchase order value from the reasonably competitive coproduced price to evaluate subcontract proposals involving European companies. Proposals that are equal to or less than the reasonably competitive purchase order value can be agreed to by General Dynamics as part of normal contract negotiations. If, however, a proposal exceeds this value, General Dynamics must notify the F-16 System Program Office, which makes the final determination whether coproducers meet reasonably competitive criteria.

General Dynamics established a premium for every component that was coproduced by companies in European participating countries by analyzing the actual tasks and production elements for the 998 program. The premium is the amount that the average coproduced price exceeded

the average domestic price for a component for the 998 program. According to the requirements of the memorandum of understanding, European currencies were converted to U.S. dollars with October 1974 exchange rates to compute coproduced prices. Both the coproduced and domestic prices were calculated in January 1980 U.S. dollars to facilitate price comparisons. The methodology General Dynamics used to compute the premiums is shown in figure I.1.

Figure I.1: General Dynamics' Calculation of the 998 Program Premium

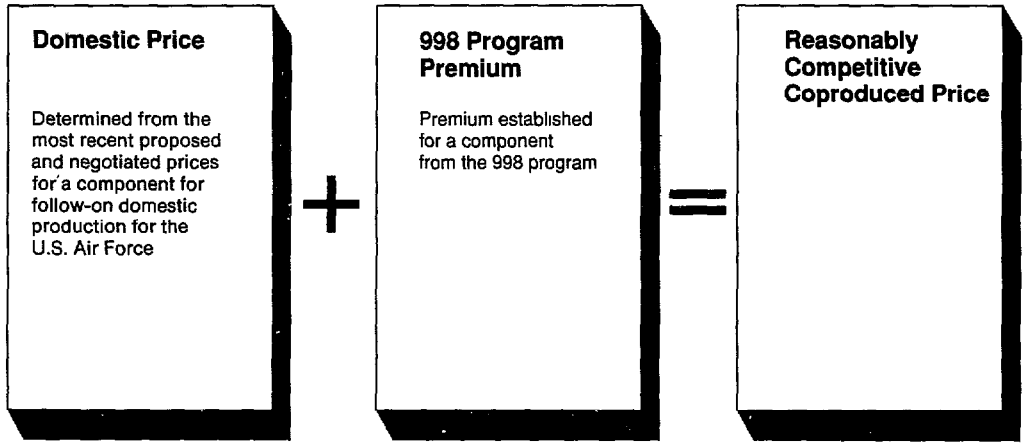


Note: Support and shipping costs include General Dynamics' earnings.

Note: Prices were calculated in January 1980 U S. dollars

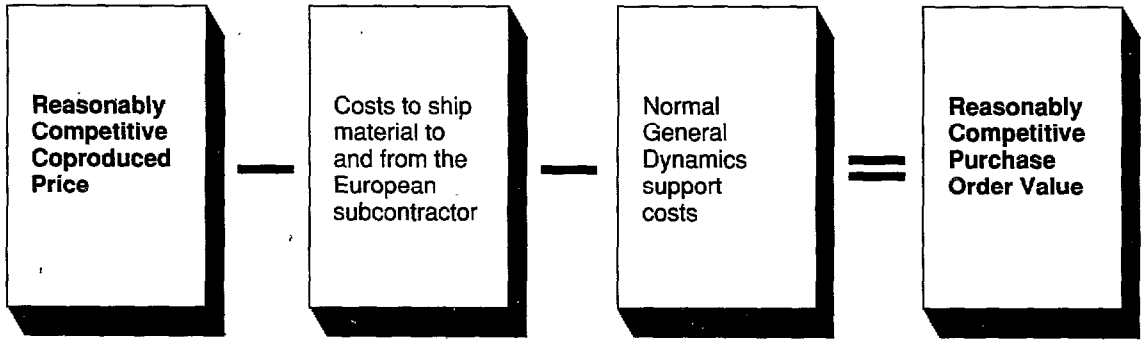
For follow-on production contracts, General Dynamics updated the domestic prices of European coproduced components to reflect the latest proposed or negotiated prices for the contracts and added the 998 program premiums to those prices to establish reasonably competitive coproduced prices. General Dynamics calculated reasonably competitive purchase order values by subtracting its shipping and support costs from these prices. Early in the initial multiyear procurement phase, General Dynamics began producing the F-16 C/D configuration in addition to the original F-16 configuration, the F-16 A/B. The same 998 program premiums were applied to domestic prices regardless of the aircraft configuration. The only time premiums changed was when parts were deleted and new parts were added. When this occurred, the premiums for the deleted items were combined and allocated to the new items. General Dynamics' methods of calculating reasonably competitive coproduced prices and reasonably competitive purchase order values, or ceiling prices, for follow-on production involving European companies are shown in figures I.2 and I.3, respectively.

Figure I.2: General Dynamics' Calculation of the Reasonably Competitive Coproduced Price



Note: Prices were calculated in January 1980 U.S. dollars.

Figure I.3: General Dynamics' Calculation of the Reasonably Competitive Purchase Order Value



Note: Shipping and support costs include General Dynamics' earnings.

Note: Prices were calculated in January 1980 U.S. dollars.

General Dynamics' Calculations for Premiums and Reasonably Competitive Purchase Order Values for the Aft and Center Fuselages and the Ammo Handling System

For each F-16 component coproduced by European companies, General Dynamics adds the 998 program premium to its domestic price for follow-on production to set a reasonably competitive coproduced price. General Dynamics computes a reasonably competitive purchase order value from this price to evaluate subcontract proposals involving European companies. Proposals that are equal to or less than the reasonably competitive purchase order value can be agreed to by General Dynamics as part of normal contract negotiations. If, however, a proposal exceeds this value, General Dynamics must notify the F-16 System Program Office, which makes the final determination whether coproducers meet reasonably competitive criteria.

General Dynamics established reasonably competitive premiums for the aft and center fuselages and the ammo handling system by computing the differences between their domestic and European coproduced prices for the 998 program. The premiums were used to compute the reasonably competitive purchase order values (ceiling prices) for the components for follow-on production. The methods and data General Dynamics used to calculate the components' domestic and coproduced prices for the 998 program and their respective reasonably competitive purchase order values for follow-on production are described below.

Calculation of the 998 Program Domestic Prices for the Aft and Center Fuselages

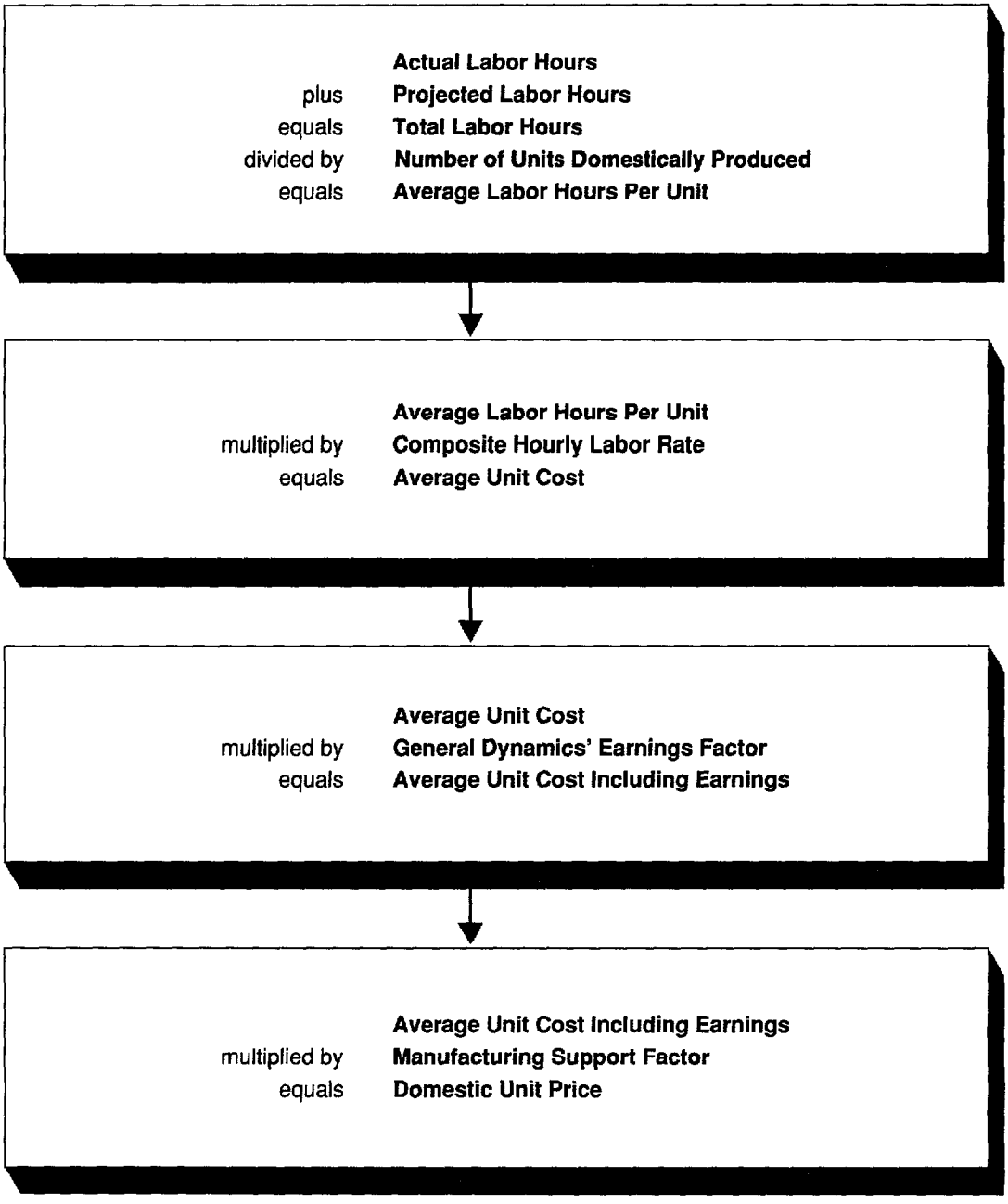
General Dynamics' process for calculating the 998 program domestic prices for the aft and center fuselages is shown in figure II.1. To calculate domestic prices, General Dynamics determined the number of labor hours required to produce the components for the 998 program from recorded actual hours and a projection of hours to complete domestic production. Learning curves derived from the actual hours were used to make the projections. The total hours computed from the actual and projected hours were divided by the number of units domestically produced to compute the average labor hours to produce one unit. (Actual hours comprised about 78 percent of the total hours for the aft fuselage and about 76 percent of the total hours for the center fuselage.)

General Dynamics applied a composite hourly labor rate for direct and indirect costs to the average labor hours per unit to compute average unit costs. The composite labor rate was developed with January 1980 direct labor rates, average negotiated indirect cost rates from the 998 program, and labor composition (i.e., manufacturing, research and engineering, tool manufacturing, and plant engineering labor) that was planned for the first year of the initial multiyear contract. General Dynamics used planning data rather than actual data to determine labor

composition because labor accounting records were not available at a sufficient level of detail for the 998 program.

General Dynamics applied an earnings factor to the average unit cost and a manufacturing support factor to the average unit price (cost plus earnings) for each item to set the domestic unit price for the 998 program premium calculations. Neither of these factors was included in the composite labor rate mentioned above. The earnings factor was representative of General Dynamics' earnings on 998 program contracts, and the manufacturing support factor was negotiated with the U.S. government. General Dynamics furnished materials to the European companies for the aft and center fuselages; therefore, material costs were not included in either the domestic or coproduced prices.

Figure II.1: Calculation of the 998 Program Domestic Prices for the Aft and Center Fuselages



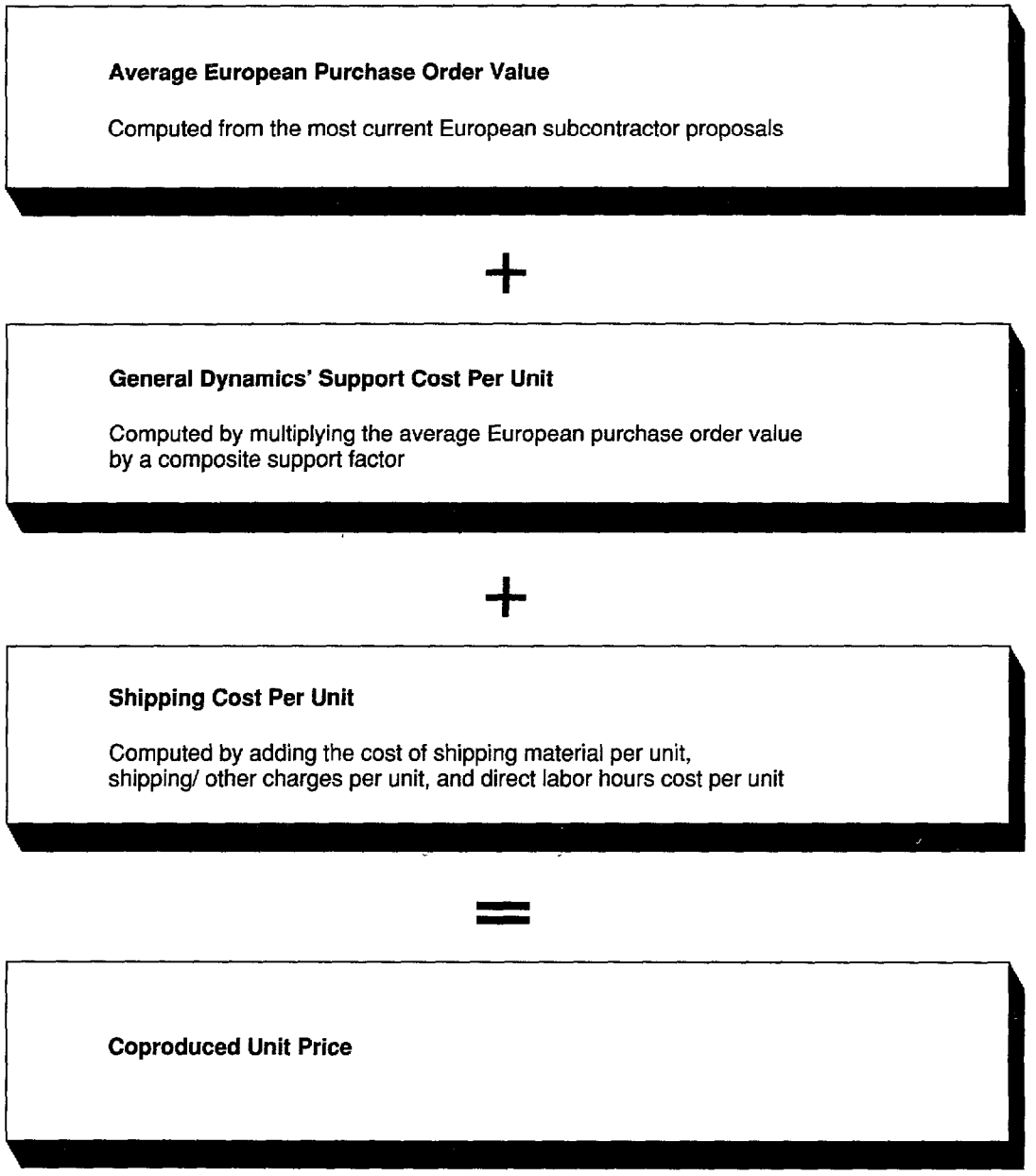
Calculation of the 998 Program Coproduced Prices for the Aft and Center Fuselages

General Dynamics' process for calculating the 998 program coproduced prices for the aft and center fuselages is shown in figure II.2. General Dynamics calculated coproduced prices by adding support costs and the costs to ship materials to and from the European companies to the average European purchase order values for these components for the 998 program.

The average European purchase order values were computed by General Dynamics from the most current European subcontractor proposals. The proposals were converted by General Dynamics from European currencies to U.S. dollars with October 1974 exchange rates and expressed in January 1980 U.S. dollars to facilitate comparisons to domestic prices, which were calculated in January 1980 U.S. dollars. The support costs were based on a composite factor consisting of coproducer support, material overhead, product liability insurance, general and administrative expenses, cost of money, and earnings.

General Dynamics' shipping costs consisted of shipping material, transportation, direct labor, and shipping support costs. The shipping support costs included overhead, product liability insurance, general and administrative expenses, cost of money, and earnings. The various elements of support costs that were applied to both purchase orders and shipping costs were based mainly on indirect cost rates experienced during the 998 program. The earnings were representative of General Dynamics' earnings on 998 program contracts.

Figure II.2: Calculation of the 998 Program Coproduced Prices for the Aft and Center Fuselages



Note: Support and shipping costs include General Dynamics' earnings.

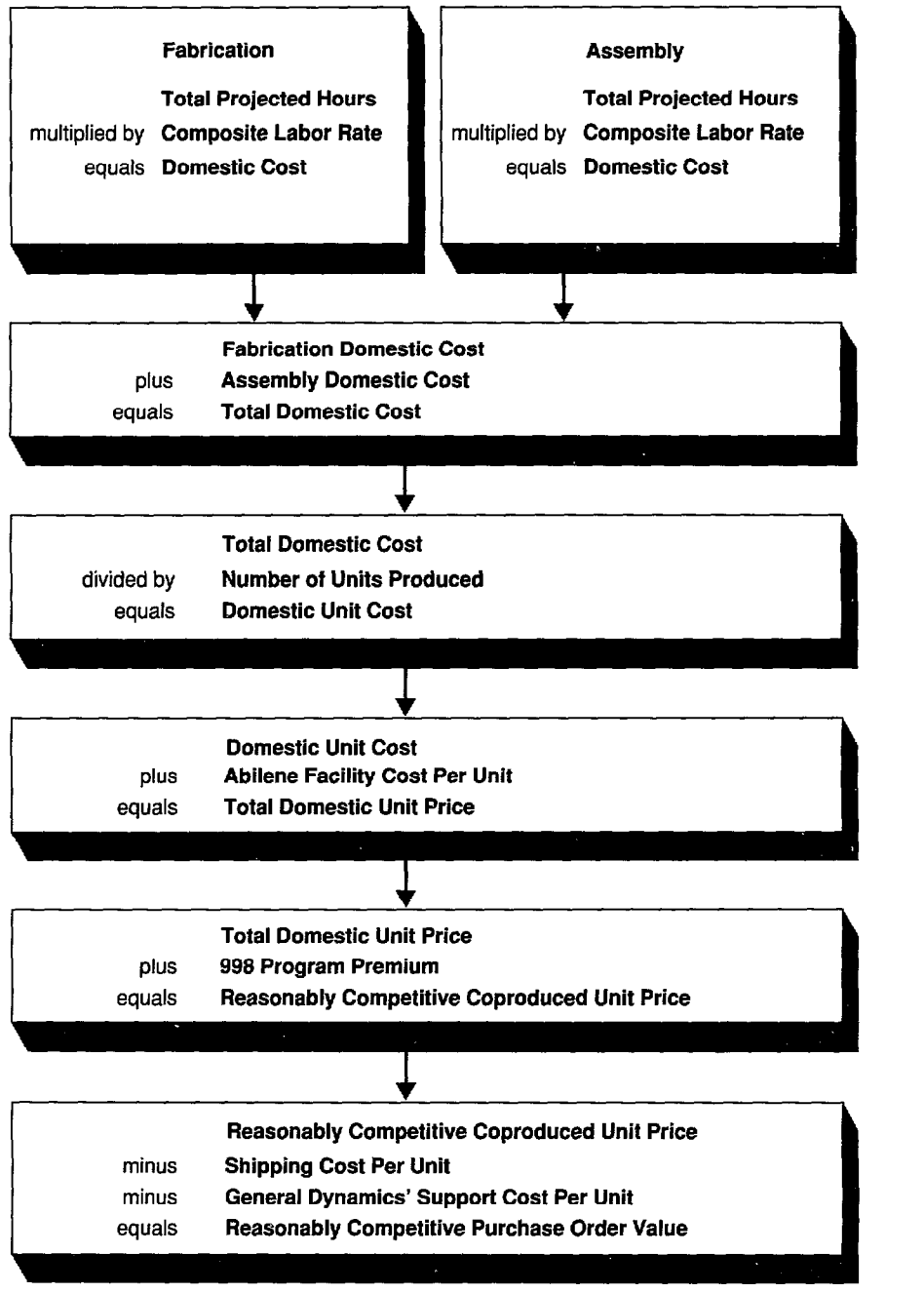
Calculation of the Reasonably Competitive Purchase Order Values for the Aft and Center Fuselages

General Dynamics' process for calculating the reasonably competitive purchase order values for the aft and center fuselages is shown in figure II.3. To establish reasonably competitive purchase order values for the initial multiyear contract, General Dynamics used domestic prices for the contract period, added the 998 program premiums, and adjusted the prices to exclude its shipping and support costs.

General Dynamics determined the domestic prices for the initial multiyear contract period by (1) applying a composite labor rate (including earnings) to its projected hours for fabrication and assembly tasks, (2) dividing the resultant domestic cost by the number of units to be produced for the U.S. Air Force to compute an average unit domestic cost, and (3) adding additional machine shop costs for work to be completed at General Dynamics' facility in Abilene, Texas. General Dynamics developed the fabrication and assembly composite labor rates primarily with January 1980 direct labor rates, average negotiated indirect cost rates for the initial multiyear proposal, labor composition based on detailed analyses, and an earnings rate representative of its earnings on 998 program contracts.

General Dynamics added the 998 program premiums for the aft and center fuselages to their respective domestic unit prices to set reasonably competitive coproduced unit prices for the items. Shipping and support costs were subtracted from the reasonably competitive coproduced unit prices to establish reasonably competitive purchase order values. The indirect cost rates General Dynamics used in computing the support and shipping costs were the average negotiated rates for the initial multiyear proposal.

Figure II.3: Calculation of the Reasonably Competitive Purchase Order Values for the Aft and Center Fuselages



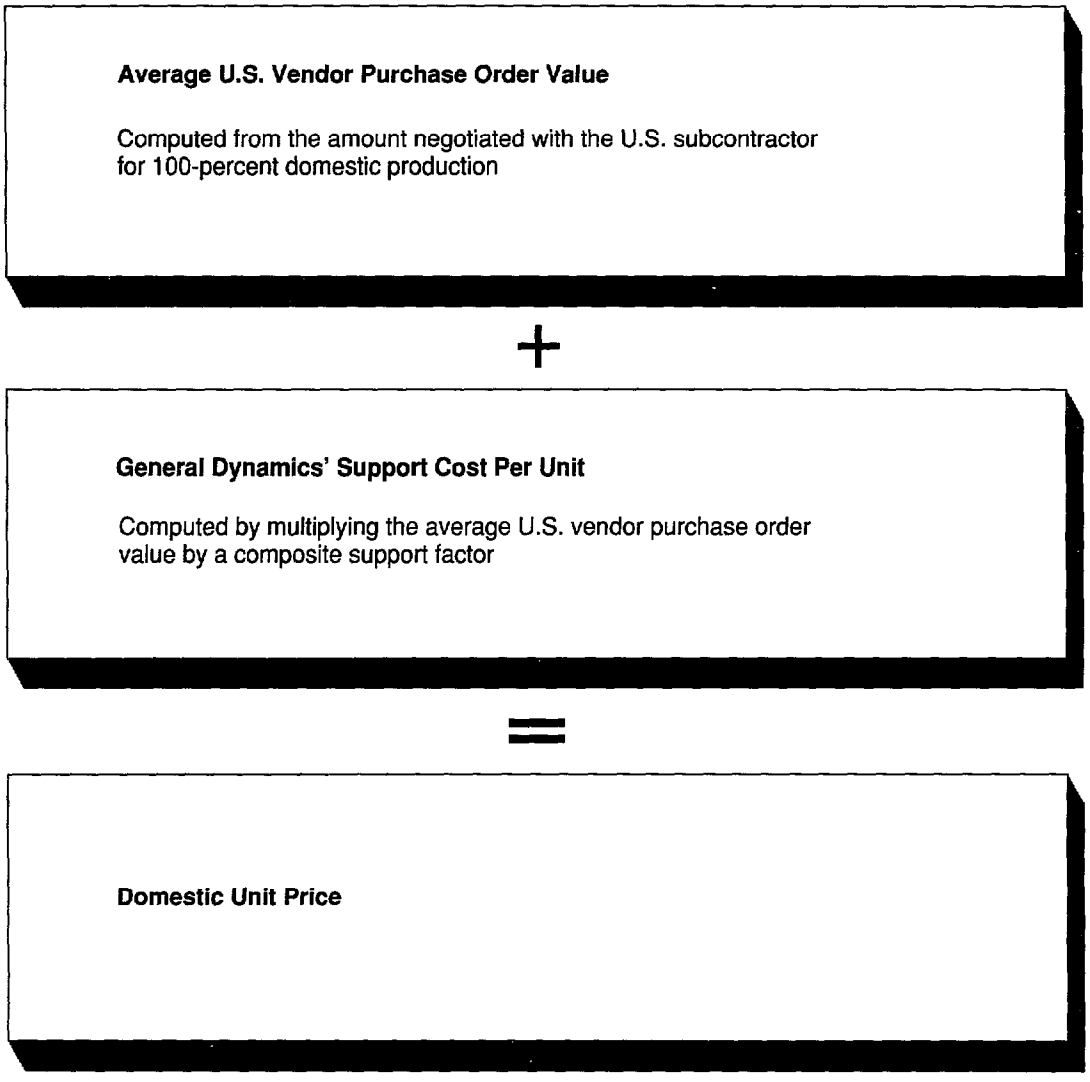
Note: The composite labor rates and all cost elements include General Dynamics' earnings

Calculation of the 998 Program Domestic Price for the Ammo Handling System

General Dynamics' process for calculating the 998 program domestic price for the ammo handling system is shown in figure II.4. To calculate the domestic price, General Dynamics added support costs to the average domestic purchase order value for the 998 program. General Dynamics computed the average domestic purchase order value from the amount negotiated with its U.S. subcontractor for 100-percent domestic production. (For the 998 program, General Dynamics and its U.S. subcontractor negotiated separate agreements for 100-percent domestic production and for domestic production with European participation.) Support costs were applied with a composite factor.

General Dynamics' composite support factor included product quality assurance labor, labor overhead, fringe benefits, vendor support, material overhead, product liability insurance, general and administrative expenses, cost of money, and earnings. The composite support factor was developed with January 1980 labor rates, actual and negotiated indirect cost rates for the 998 program, and an earnings rate representative of General Dynamics' earnings on 998 program contracts.

Figure II.4: Calculation of the 998 Program Domestic Price for the Ammo Handling System



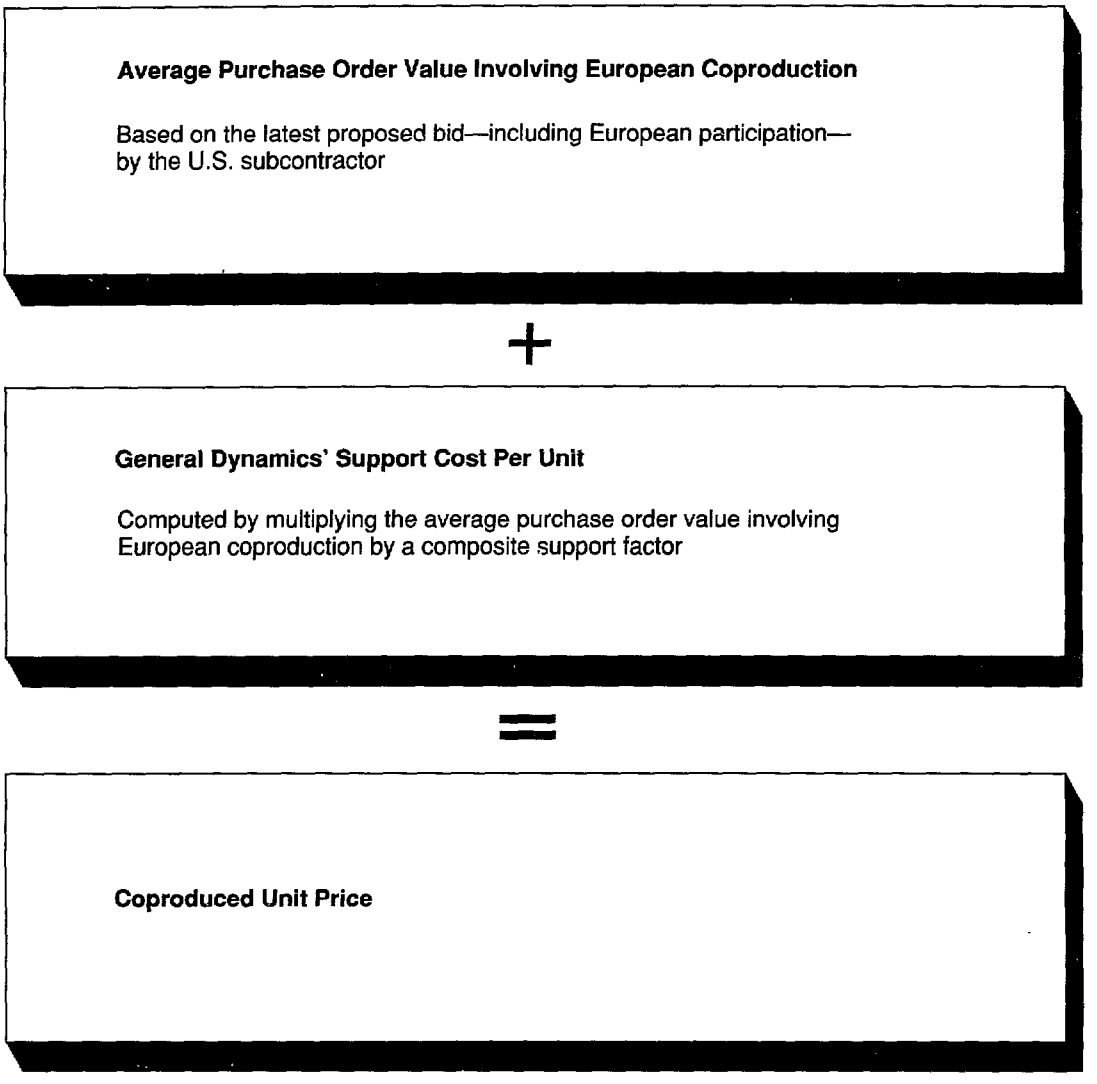
Note Support costs include General Dynamics' earnings.

Calculation of the 998 Program Coproduced Price for the Ammo Handling System

General Dynamics' process for calculating the 998 program coproduced price for the ammo handling system is shown in figure II.5. General Dynamics calculated the coproduced price by applying the same support factor that was used in setting the domestic price to the average purchase order value involving European coproduction. This purchase order value was based on the latest proposed bid—including European participation—by the U.S. subcontractor; the European portion of the proposal was converted to U.S. dollars with October 1974 currency exchange rates.

Shipping costs were not added to the European coproduction purchase order value because General Dynamics did not ship material for the ammo handling system to its U.S. subcontractor or to European coproducers.

Figure II.5: Calculation of the 998 Program Coproduced Price for the Ammo Handling System



Note: Support costs include General Dynamics' earnings.

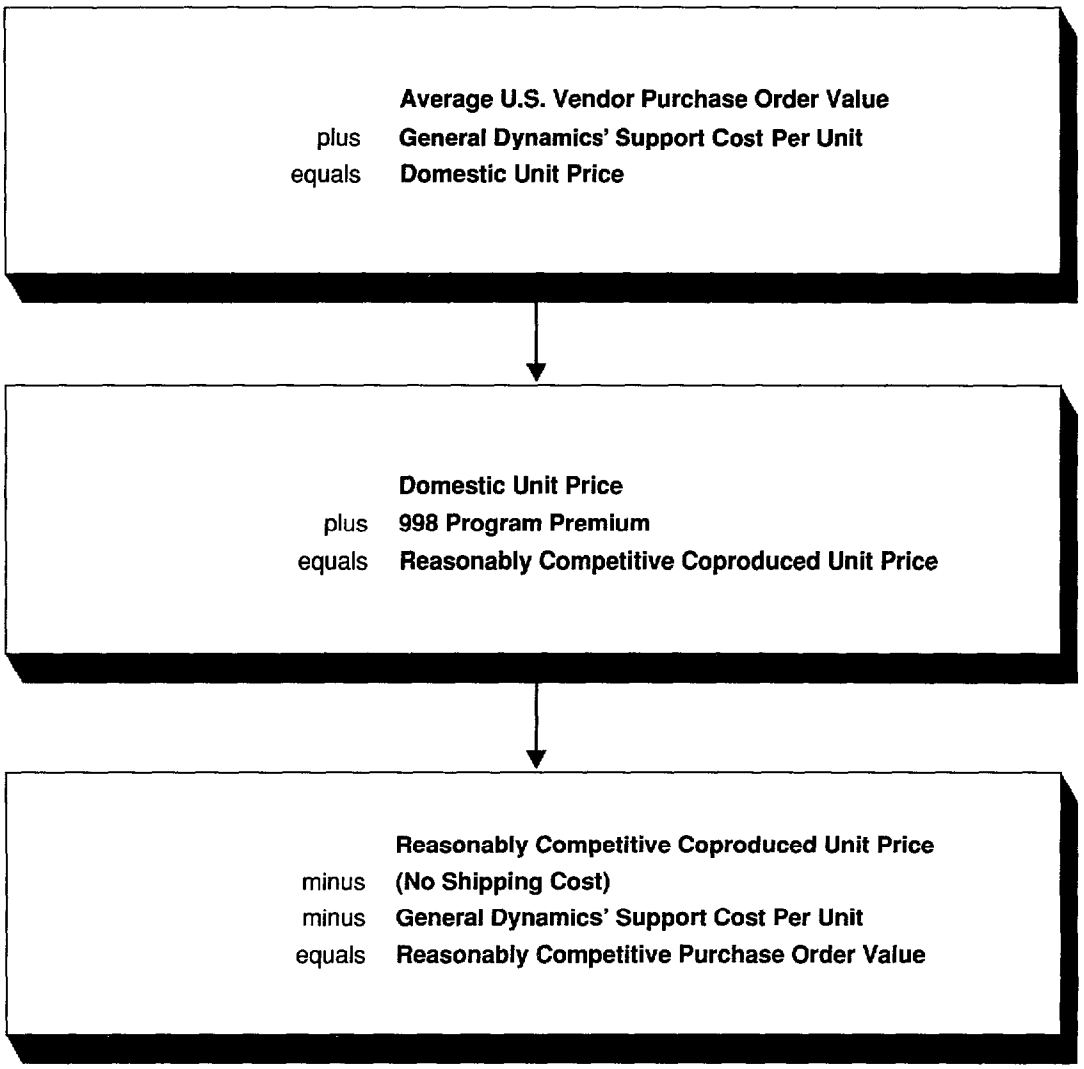
Calculation of the Reasonably Competitive Purchase Order Value for the Ammo Handling System

General Dynamics' process for calculating the reasonably competitive purchase order value for the ammo handling system is shown in figure II.6. To establish a reasonably competitive purchase order value for the initial multiyear contract, General Dynamics computed the domestic price for the component for the contract, added the 998 program premium, and adjusted the price to exclude support costs.

General Dynamics determined the domestic price by adding support costs to the average negotiated purchase order value for domestically produced items. General Dynamics used negotiated values from fiscal year 1983 of the initial multiyear contract because only domestic production was planned for that year. (European coproduction was planned for fiscal years 1984 and 1985.) The support costs were added to the purchase order value with a composite factor that included product quality assurance labor, labor overhead, fringe benefits, vendor support, material overhead, product liability insurance, general and administrative expenses, cost of money, and earnings. The composite factor was developed with January 1980 labor rates, negotiated indirect cost rates for the initial multiyear proposal, and an earnings rate representative of General Dynamics' earnings on 998 program contracts.

General Dynamics added the ammo handling system's 998 program premium to its domestic unit price to set the reasonably competitive coproduced unit price. To establish the reasonably competitive purchase order value for its subcontractor, General Dynamics subtracted support costs from the reasonably competitive coproduced unit price using the composite support factor mentioned above.

Figure II.6: Calculation of the Reasonably Competitive Purchase Order Value for the Ammo Handling System



Note: Support costs include General Dynamics' earnings

Support Examined by GAO for Factors Used in the Reasonably Competitive Premium Calculations

Table III.1: Calculation of the 998 Program Domestic Prices for the Aft and Center Fuselages

Factor	General Dynamics' documents reviewed
Actual labor hours	Printout of actual hours by unit
Projected labor hours	Printout of hours by unit projected on a learning curve based on the actual hours provided
Composite hourly labor rate	Planned manufacturing hours for fabrication and assembly during fiscal year 1982 Cost Breakdown Schedules for Labor Composition Estimating Factor Documents for Forward Pricing and Experienced Rates 998 Program Worksheet for Average Indirect Costs
General Dynamics' earnings factor	Letters of confirmation of negotiations concerning contract no. F33657-75-C-0310 and the worksheet computing the average earnings for the 998 program
Manufacturing support factor	Estimating Factor Document for Factor/Field Operations Support
Domestic unit price	Calculation worksheets

Table III.2: Calculation of the 998 Program Coproduced Prices for the Aft and Center Fuselages

Factor	General Dynamics' documents reviewed
Average European purchase order value	Engineering Change Proposal—0006, F-16 Multinational Fighter Program (998 aircraft) Subcontractor Computer Summaries (Fact Finding Current Data) and corresponding summaries and worksheets Escalation Used for Rebasing Subcontract/Coproducer Cost, January 1975/1978 Constant Year Dollars to January 1980 Constant Year Dollars
Composite support factor	Material Support Factor Computation Worksheet and corresponding Estimating Factor Documents Letters of confirmation of negotiations concerning contract no. F33657-75-C-0310 and the worksheet computing the average earnings for the 998 program
Shipping cost per unit	Calculation worksheets for shipping costs Tabulation sheets, prepared by the Shipping and Estimating Departments, noting the cost of materials used for shipping, shipping/other charges per unit, and direct labor hours cost per unit Shipping composite rate computation for direct labor Estimating Factor Document for Shipping Inspection
Coproduced unit price	Calculation worksheets

Table III.3: Calculation of the Reasonably Competitive Purchase Order Values for the Aft and Center Fuselages

Factor	General Dynamics' documents reviewed
Estimated hours for fabrication and assembly	Printout of estimated hours for the initial multiyear contract
Composite labor rate, including earnings, for fabrication and assembly	Composite Rate Worksheet and corresponding Estimating Factor Documents
Number of units produced	Printout of A/B and C/D units produced domestically for each year during the initial multiyear contract
Abilene facility cost per unit	Composite Rate Worksheet for the Abilene Facility and Tabulation Sheet for Average Hours by fiscal year
Shipping cost per unit	Calculation worksheet for shipping prices Composite Rate Worksheet (shipping labor, shipping/other charges, and shipping material) and corresponding Estimating Factor Documents
Composite support factor	Composite Rate Worksheet for the Material Support Factor and corresponding Estimating Factor Documents
Reasonably competitive purchase order value	Comparison of F-16 Domestic and European Participating Government Coproduction Prices, Reasonably Competitive Study Calculation worksheets

Table III.4: Calculation of the 998 Program Domestic Price for the Ammo Handling System

Factor	General Dynamics' documents reviewed
Average U.S. vendor purchase order value	Engineering Change Proposal—0006, F-16 Multinational Fighter Program (998 aircraft) Subcontractor Computer Summaries (Fact Finding Current Data) Reconciliation of Reasonably Competitive Pricing Worksheet Negotiation Summary Letter of Audit Resolution Escalation Used for Rebasing Subcontract/Coproducer Cost, January 1975/1978 Constant Year Dollars to January 1980 Constant Year Dollars Detailed Price/Cost Analysis of the Proposal
Composite support factor	Material Support Factor Computation Worksheet and corresponding Estimating Factor Documents Letters of confirmation of negotiations concerning contract no. F33657-75-C-0310 and the worksheet computing the average earnings for the 998 program
Domestic unit price	Comparison of F-16 Domestic and European Participating Government Coproduction Prices (Jan. 1980 U.S. Dollars with Oct. 1974 Exchange Rates) Reasonably Competitive Study Reconciliation of Reasonably Competitive Pricing for Purchase Order 301 Calculation worksheet

Table III.5: Calculation of the 998 Program Coproduced Price for the Ammo Handling System

Factor	General Dynamics' documents reviewed
Average purchase order value involving European coproduction	Engineering Change Proposal—0006, F-16 Multinational Fighter Program (998 aircraft) Subcontractor Computer Summaries (Fact Finding Current Data) Reconciliation of Reasonably Competitive Pricing Worksheet Negotiation Summary Letter of Audit Resolution Escalation Used for Rebasing Subcontract/Coproducer Cost, January 1975/1978 Constant Year Dollars to January 1980 Constant Year Dollars Detailed Price/Cost Analysis of the Proposal
Composite support factor	Material Support Factor Computation Worksheet and corresponding Estimating Factor Documents Letters of confirmation of negotiations concerning contract no. F33657-75-C-0310 and the worksheet computing the average earnings for the 998 program
Coproduced unit price	Reconciliation of Reasonably Competitive Pricing for Purchase Order 301 Calculation worksheet

Table III.6: Calculation of the Reasonably Competitive Purchase Order Value for the Ammo Handling System

Factor	General Dynamics' documents reviewed
Average U.S. vendor purchase order value	Calculation worksheet with corresponding documents, memorandums, summaries, and worksheets
Composite support factor	Composite Rate Worksheet and corresponding Estimating Factor Documents
Reasonably competitive purchase order value	Comparison of F-16 Domestic and European Participating Government Coproduced Prices (Jan. 1980 U.S. Dollars with Oct. 1974 Exchange Rates) Calculation worksheet

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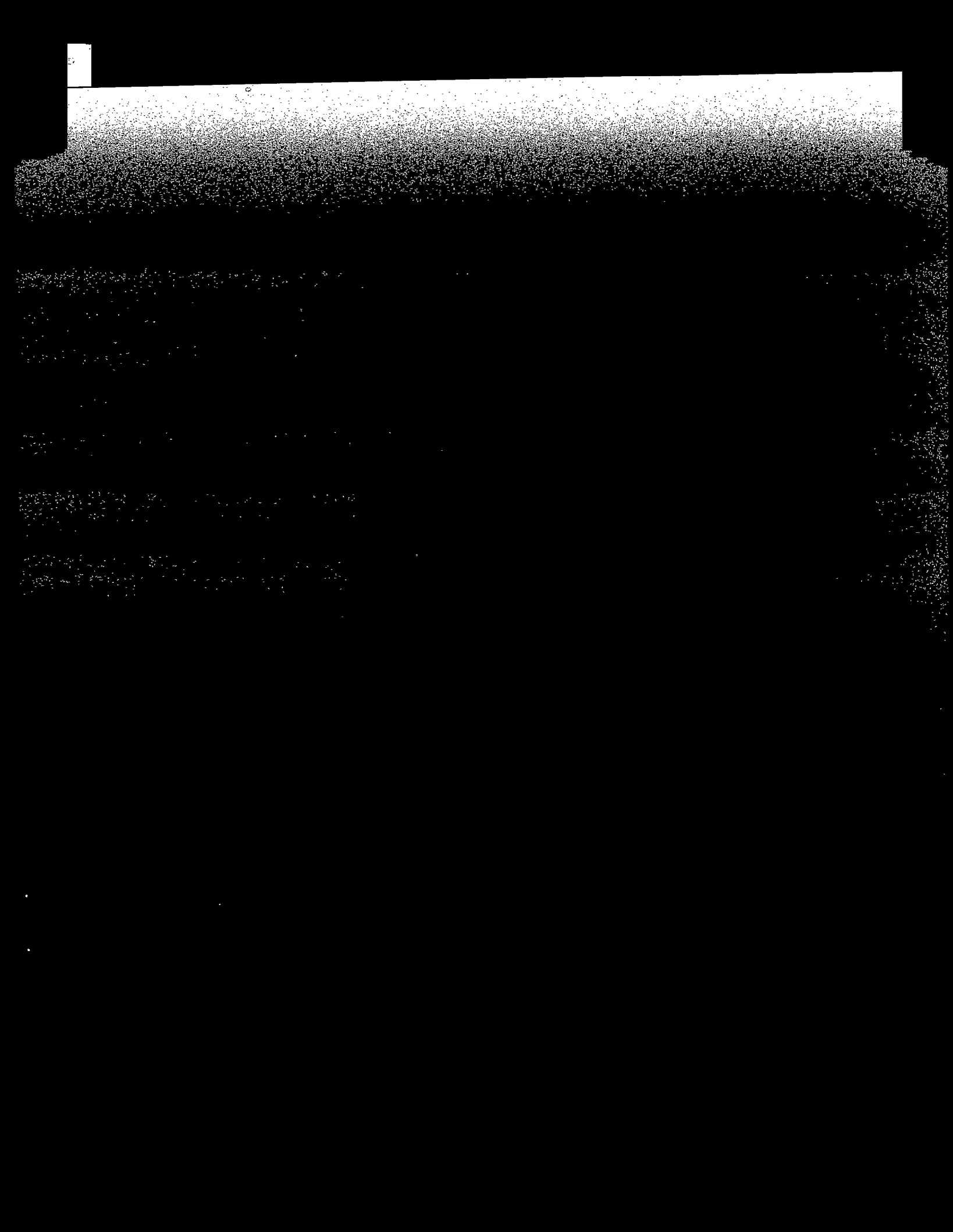

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