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The F-16 is a multibillion dollar program calling for coproduction of a new fighter aircraft by a consortium consisting of Belgium, Denmark, the Netherlands, Norway, and the United States. The arrangement should aid in standardization of weapon systems in the North Atlantic Treaty Organization, provide a low cost fighter, and increase industrial activity for participants. The coproduction show the effect of European participating governments' program costs. However, the advantages of coproduction may outweigh the difficulties and added costs. Recommendations: The Armed Services and Appropriations Committees of the Congress should carefully explore the impacts on schedules and costs of any proposed U.S. funding changes, especially as they affect the participating European governments. The Secretary of Defense should instruct the Secretary of the Air Force to closely monitor the development of: (1) a cost accumulation and estimating system that will accurately show the effect of European participating governments coproduction on U.S. Air Force aircraft costs and on the European participating governments' not-to-exceed price; and (2) the development of a system for monitoring progress in accomplishing the Memorandum of Understanding offset commitments, both in terms of dollar value and quantities of equipment items. Particular care should be taken to avoid the use of not-to-exceed prices and to avoid any implication that changes are unlikely in negotiations for future acquisition of the weapons system. (Author/SC)

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REPORT TO THE CONGRESS

*BY THE COMPTROLLER GENERAL
OF THE UNITED STATES*

Sharing The Defense Burden: The Multinational F-16 Aircraft Program

Department of Defense

The F-16 will be coproduced by the United States and four European countries. The arrangement should aid in standardization of weapon systems in NATO, provide a low-cost fighter, and increase industrial activity for participants.

Coproduction agreements present many management challenges and are likely to result in higher program costs. However, the advantages of coproduction may outweigh the difficulties and added costs.

Committees of Congress should carefully explore the impact of any proposed funding changes, taking into consideration the international aspects of the program.

In order to assess the economic impact, the Secretary of Defense should expedite development of a system to reflect the cost of coproduction. Further, in future coproduction agreements, care should be taken to avoid use of terms like not-to-exceed price when providing price quotations early in a program.



COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20547

B-163058

To the President of the Senate and the
Speaker of the House of Representatives

This report describes the progress made in implementing the F-16 multinational aircraft program. It highlights the agreements reached, commitments made, participants' responsibilities, and the status of the contract awards to the European contractors.

In view of the complexity of the F-16 multinational program, and the inherent problems in any European coproduction, it is to be expected that a variety of critical issues will surface as the program matures. The report presents a discussion of the current most critical issues which could have an impact on the program as well as the relationship established between the United States and the European Participating Governments in order to implement this program.

We made our review pursuant to the Budget and Accounting Act, 1921 (31 U.S.C. 53) and the Accounting and Auditing Act of 1950 (31 U.S.C. 67).

This report is also being sent today to the Director, Office of Management and Budget, and the Secretary of Defense.

A handwritten signature in black ink, reading "Luther B. Stathi".

Comptroller General
of the United States

D I G E S T

For some years many military and government officials have strongly urged that the NATO allies increase the standardization of their weapons and equipment. Standardization offers

- greater combat capability because of opportunities for improved logistics support; common maintenance and training activities; and increased ability to develop common doctrine and tactics and
- reduced costs by elimination of duplicate development of similar systems and by production of greater quantities of any one item.

There are political and/or economic barriers to adoption of standard weapons and equipment; that is, it may not be feasible for many of the NATO allies to purchase major systems outright, from an outside source. Each nation has a need to maintain high levels of employment, develop a modern industrial base, and preserve a reasonable balance of international trade.

One method of overcoming those problems is for each participating nation to share in the production. Coproduction arrangements probably will become more prevalent, and GAO has prepared this report to present the advantages of the F-16 coproduction agreement and the issues that can be anticipated on this and future programs.

The F-16 is a multi billion-dollar program calling for coproduction of a new fighter by a consortium consisting of Belgium, Denmark, The Netherlands, Norway, and the United States. The F-16 was developed by General Dynamics Corporation and is a product of the experimental lightweight fighter program of the early 1970's. (See p. 1.)

Present arrangements calling for some production in Europe seem to be the most acceptable solution to meeting the European production requirements. The

four European nations procuring the F-16 agree that they can benefit by procuring an aircraft developed in the U.S. and by producing part of the aircraft in their factories. This allows them to acquire a new fighter without costly development requirements, except for a pro rata share of the research and development cost for each aircraft, and to gain the benefits of production. They stressed that, politically, production in Europe was indispensable to buying the aircraft. In turn, their procurement of an American fighter has military and economic benefit for the United States. (See pp. 1 and 2.)

A total of 998 aircraft are now planned for production--348 for the European countries and 650 for the U.S. Air Force. Ultimately, the United States plans to buy 1,388 aircraft. A sale of 160 aircraft to Iran has been approved and additional sales are possible in Israel, Spain, Turkey, and Greece. (See p. 2.)

The basic F-16 program is defined by a Memorandum of Understanding, signed by the five nations in June 1975. In general, the Memorandum provides that:

--Production and assembly contracts equal to 58 percent of the value of the 348 European aircraft will be placed with European contractors. This will be provided by having the Europeans participate in the production of their own aircraft and U.S. Air Force aircraft. The Europeans will also participate in production of third country sales. (See pp. 5 and 6.)

--European contract costs are to be reasonably competitive with the costs to produce the same items in the United States. (See pp. 15 and 16.)

--There is a not-to-exceed unit production price goal of \$6.091 million (in 1975 dollars). (See p. 16.)

The program has been structured as a foreign military sale in which all aircraft are delivered by the prime contractor to the U. S. Government which, in turn, sells the agreed quantities to the other four countries. (See p. 7.)

Initiating and managing a coproduction program of the magnitude of the F-16 has been, and continues

to be, extremely difficult and complex. Considering its complexity and the fact that there are five sovereign nations involved, significant progress has been made in resolving administrative, political, and economic issues. Department of Defense and European officials believe that resolution of these issues is reasonably well in hand and should present no major obstacle to the success of the F-16 program. The issues that have become evident are:

- Because of relatively high labor rates and the need to make significant investments in new facilities and tooling, and possible other factors, European-produced items are expected to be more costly than U.S. produced components. According to the U.S. Air Force, the increase in total procurement quantities, as a result of European participation, should offset the higher European costs. However, the U.S. Air Force has estimated a net cost increase to the Air Force production program of \$70 to \$241 million due to coproduction. (See pp. 15 and 16.)
- The price to be paid by the European governments is to include over \$200 million to reimburse the United States for research and development expenses. Because of European funding limitations, the Department of Defense offered to defer this recoupment. Three of the countries have accepted this offer. The deferred payments will accrue interest until paid. (See p. 13.)
- There is no common understanding of the meaning of the not-to-exceed price of \$6.091 million for European aircraft. U.S. officials consider this to be an estimate and a goal to strive for, which cannot be guaranteed by the U.S. Government. The European governments look upon the price as a firm commitment laid down in the Memorandum of Understanding and made by the U.S. Government which expressed its confidence that the not-to-exceed price could not be exceeded. While recognizing that the U.S. Government cannot legally guarantee the not-to-exceed price, the European Participating Governments consider that this price was provided with approximately 90 percent of its content covered contractually by the airframe and engine contractors. The representatives of the Participating Governments consider that the consequences of a breach would be very significant, and would have grave political impact on the European Participating Governments. They feel that in the event

that the price is exceeded, then the matter would be taken to the Multinational Steering Committee composed of each of the participating governments. The interpretation of the meaning of the not-to exceed price could be an issue for future resolution if there is unforeseen cost growth. (See pp. 16 and 17.)

- Department of Defense officials have stated that the Europeans will perform F-16 depot maintenance on U.S. F-16 aircraft only if it is cost-effective for the U.S. One European government, however, considers that the U.S. has a commitment to overhaul F-16 components in Europe. The extent of European depot maintenance of European-based F-16s, its cost-effectiveness, and the Europeans' satisfaction with their share of the workload are issues that should be resolved promptly. (See pp. 19 and 20.)
- There have been some delays in awarding contracts to European contractors--with resulting delays in ordering of tooling and qualification of manufacturing processes. To prevent late deliveries, U.S. producers will supply parts to the Europeans. All of the contractors are confident that their delays can be overcome, and that the schedule can be maintained. It will be sometime in 1978 before it can be determined if the current production schedule can be met and if there is any impact from the arrangements made to have U.S. contractors supply parts to Europe. (See pp. 20, 21, and 22.)
- There has been some disagreement between the United States and the other nations on the calculations of the value of production placed in Europe. Discussions are taking place to reach agreement on the interpretation of words such as "procurement value" and "specifically directed purchases", and how to treat subcontracts placed back in the United States by the Europeans. (See pp. 22, 23, and 24.)
- Other issues that have arisen and that have been or are in the process of being resolved are:
 - agreement on treatment of currency rate fluctuations (see pp. 18 and 19),
 - agreement on inflation rates to be applied (see pp. 17 and 18),

--methods of compliance by European contractors with U.S. procurement regulations, cost accounting standards, contract audit practices, and quality control practices. (See p. 11.)

The progress of weapons systems developments and production in the United States is subject to congressional oversight and approval. When, however, the Congress approves U.S. participation in a coproduction effort such as the F-16 program it may, in effect, significantly restrict its own prerogatives and options. Although full-scale production of the F-16 has not been approved, the four foreign governments and their contractors have reached a "point of no return". In accordance with Department of Defense long-lead decisions, significant sums have been, and are currently being, expended for facilities and tooling. In some cases initial production of parts has already begun. Furthermore, the labor practices and economic conditions in European countries generally militate against major changes in program schedules and funding. As a result, the Congress should be aware that changes in the F-16 program that would adversely impact schedules, and/or costs, could cause severe political repercussions in the other four participating nations and could affect U.S. relations with those nations.

GAO has been denied access to the records of the Multinational Fighter Program Steering Committee on the grounds that these are sensitive international discussions. GAO has reviewed only the decision documents issued by the Steering Committee. Consequently, it has no assurance that its review surfaced all the significant issues associated with this program. (See pp. 3 and 4.)

CONCLUSIONS AND RECOMMENDATIONS

Coproduction arrangements for major weapons systems are a logical method for increasing the level of standardization in NATO. Because there are major political, economic and technological advantages for participating countries, it is probable that there will be increased pressure on the United States in the future for more programs like the F-16.

Coproduction agreements are difficult and present many management challenges. Furthermore, it is

possible that total costs may be higher than if a more efficient production system were used. In GAO's opinion, the advantages of increased standardization and improved combat capability--which cannot be accurately measured--outweigh the difficulties and possible additional costs.

In GAO's opinion, congressional prerogatives to change the program schedule or reduce the funding levels have been limited by the funding commitments made by the European governments, the beginning of European production activities, the inability of the Europeans to alter their production efforts significantly, and the significant political impact such changes may have on the European Participating Governments. GAO, therefore, recommends that the Armed Services and Appropriations Committee carefully explore the impacts on schedules, costs and international relations, of any proposed funding changes.

International competition for future acquisitions of major weapons systems may require use of price quotations by U.S. negotiators at very early points in an acquisition. GAO recommends, therefore, that particular care be taken to avoid use of not-to-exceed prices to avoid any implication that changes are unlikely. (See pp. 17 and 34.)

It is important to the participating countries, and to others who may wish to engage in coproduction agreements in the future, to be able to assess the economic impacts and to determine if offset agreements are being met. GAO, therefore, recommends that the Secretary of Defense direct the Air Force to closely monitor the development of a

- cost accumulation and estimating system that will accurately show the effect of European coproduction on U.S. aircraft costs and on the European not-to-exceed price, (see p. 27) and
- system for monitoring progress in accomplishing European offset commitments both in terms of dollar value and quantities of equipment. (See p. 24.)

The Department of Defense and the State Department have reviewed this report. Defense agrees with GAO's recommendations on cost monitoring.

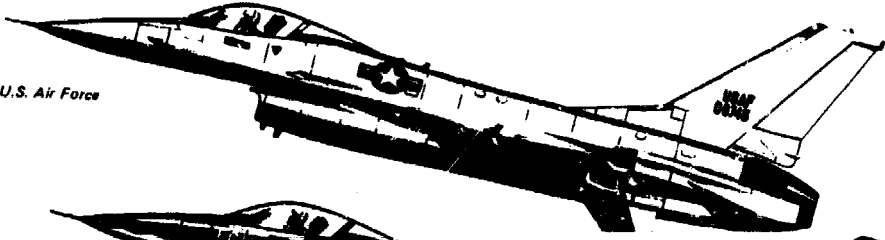
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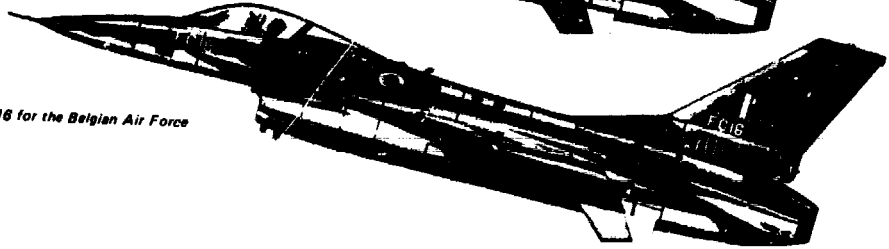
ABBREVIATIONS

AFPRO	Air Force Plant Representatives Office
ECP	engineering change proposal
EPG	European Participating Governments
GAO	General Accounting Office
MOU	Memorandum of Understanding
NATO	North Atlantic Treaty Organization
SPO	System Program Office
USAF	United States Air Force
USAFE	United States Air Force in Europe

F-16A for the U.S. Air Force



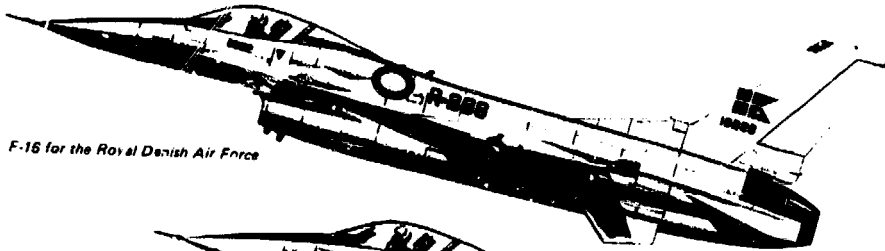
F-16 for the Belgian Air Force



THE F-16 MULTINATIONAL FIGHTER AIRCRAFT

PHOTO COURTESY OF: GENERAL DYNAMICS CORPORATION

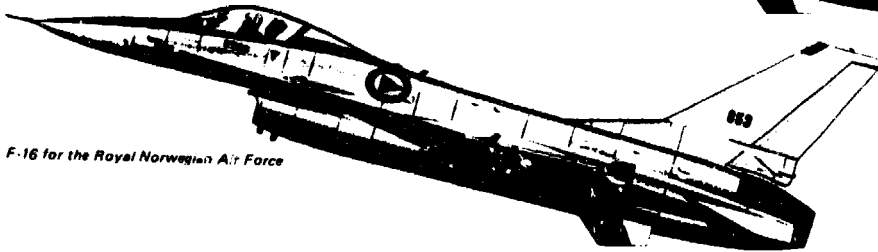
F-16 for the Royal Danish Air Force



F-16 for the Royal Netherlands Air Force



F-16 for the Royal Norwegian Air Force



CHAPTER 1

INTRODUCTION

In June 1975, after 13 months of evaluation, the European Participating Governments (EPG)--Belgium, Denmark, The Netherlands, and Norway--selected the F-16 aircraft, from among the Swedish JA-37 Viggen, the French Mirage F-1/M 53, and the U.S. Lightweight Fighter prototypes, YF-16 and YF-17, as a replacement to modernize their current fighters. EPG identified the following conditions as necessary for their selection of a U.S. aircraft. The United States must

- be prepared to make a written commitment in June 1974 to produce one of the two U.S. prototype aircraft for its own forces and commit a substantial portion of these aircraft to deployment in Europe,
- assume program responsibility rather than expect EPG to deal with the contractor, and
- insure EPG production participation.

To encourage EPG selection of a U.S. replacement aircraft, the U.S. Air Force (USAF) supported acceleration of (1) the Lightweight Fighter program source selection and (2) full-scale development decision to the maximum extent possible consistent with technical and cost risks involved.

During discussions with the Deputy Secretary of Defense, EPG were told that the United States would develop, produce, and deploy a lightweight fighter aircraft to Europe. At that time there was no formal U.S. requirement (Required Operational Capability document) for such an aircraft in the USAF inventory. A written U.S. commitment on July 11, 1974, established source selection by January 1, 1975, and offered EPG a number of incentives to participate in the program, including involvement in the source selection and production participation. They subsequently decided to delay their decision until the USAF selection was completed. On January 13, 1975, USAF selected the F-16 aircraft and awarded a full-scale development contract to the General Dynamics Corporation.

In June 1975 EPG unanimously selected the U.S. F-16 aircraft and entered into a Memorandum of Understanding (MOU) and preliminary contracts with the United States. This agreement called for EPG to share in the production

of the European, U.S., and "third country" aircraft on the basis of EPG industry receiving contract awards equaling a dollar value of 40 percent, 10 percent, and 15 percent of the program's procurement value, respectively.

A total of 998 aircraft will be coproduced--348 for EPG countries and 650 for the United States. There is also the possibility of sizable additional sales to third countries. The USAF ultimately plans to buy 1,388 aircraft. The extent of EPG participation beyond the 650 initial USAF aircraft has not yet been decided. Sales of 160 F-16s to Iran has been approved and they want at least an additional 140. Israel, Spain, Turkey, Greece, and other countries also have shown interest in the F-16.

Early in the planning and establishment of the F-16 program it was found that potential economic benefits existed for the United States by increasing exports, thus having a positive effect on trade balances, by strengthening aerospace product sales and providing increased domestic employment. It also aided in the U.S.-EPG sharing of defense and research and development costs.

PROGRAM OBJECTIVES

U.S. objectives under the F-16 multinational fighter program are to:

- Acquire a low cost fighter to replace the F-4, supplement the F-111 and A-10 aircraft, and complement the F-15.
- Standardize weapons systems in the North Atlantic Treaty Organization (NATO).

EPG objectives are to:

- Acquire a low cost, easily maintained aircraft with advanced avionics and weapons capability.
- Standardize aircraft in NATO.
- Acquire advanced technology.
- Make optimum use of their industrial, economic and technical resources in the production of the aircraft.

PURPOSE OF REVIEW

This report will inform the Congress of the F-16 multinational program's progress and cite major issues that could affect the outcome of the multinational effort and the USAF procurement of the F-16 aircraft.

We have prepared a separate report on the status of the USAF F-16 aircraft development and planned procurement. 1/ That report covers such areas as potential subsystem problems, cost growth, survivability/vulnerability effectiveness, reasonableness of test program, increases in the quantity of aircraft being procured, and aircraft performance capabilities.

SCOPE OF REVIEW

We made our review at Headquarters, USAF; the F-16 System Program Office (SPO); the General Dynamics Corporation, Fort Worth, Texas; and the Pratt & Whitney Aircraft Group of United Technologies Corporation, East Hartford, Connecticut, and West Palm Beach, Florida. Information was obtained by reviewing program documentation and by discussions with USAF and contractor officials.

We also visited EPG and discussed the program with both government and selected industry officials.

Access to records

We did not have complete access to records during our review. For example, the Multinational Fighter Program Steering Committee and various Subcommittees, consisting of U.S. and EPG officials, met to resolve problems and clarify issues relating to the F-16 multinational program. The minutes of these meetings were not made available to us because EPG representatives expressed the following concerns:

- Premature public disclosure of matters not yet decided could result in program and political perturbations for their governments.
- Access to all coproduction records, including Steering Committee and Subcommittee minutes and documents, is too far reaching for program review purposes

1/ "Status of the F-16 Aircraft Program," PSAD-77-41, April 1, 1977.

and would have an inhibiting effect on open and frank discussions of issues in the Steering Committee.

--Subcommittees refer issues not resolvable at the Subcommittee level go to the Steering Committee for decision; therefore, release of Subcommittee working documents is inappropriate and would inhibit multinational program management.

--No assurance that the EPG would be given the opportunity to comment on our reports prior to submission to other parties, or that the recipients of such reports would honor any classifications or restrictions which EPG may assign to the material.

Because the Steering Committee and the various Subcommittees are designed to identify and resolve problems in the multinational program, we are able to obtain only limited reliable information on these areas without access to this data. We are, however, provided the Steering Committee Decision Documents as they are issued.

In view of the restrictions on our access to these pertinent program documents, we have no assurance that our review has found all of the significant problems or issues associated with the F-16 multinational program.

Officials of the Office of Secretary of Defense, the Air Force and the State Department reviewed this report. Their comments have been incorporated where appropriate.

CHAPTER 2

PROGRESS OF F-16 MULTINATIONAL PROGRAM

The F-16 multinational program presents a monumental and unprecedented challenge for the U.S. Government, U.S. prime contractors and subcontractors, EPG, and EPG coproducers. This chapter discusses the progress that has been made in implementing the program and highlights the agreements reached, commitments made, participants' responsibilities, and the status of the award of contracts to EPG contractors. Information is also provided on changes to the initial coproduction plans and other adjustments which will result in a realignment of the F-16 multinational program.

MEMORANDUM OF UNDERSTANDING

The Memorandum of Understanding (MOU), the basic charter for implementing the F-16 multinational program, was finalized on June 10, 1975. It is an executive agreement, signed by the U.S. Secretary of Defense and the respective Ministers of Defense of EPG, which sets forth the general agreements establishing the cooperative program for development, production, and procurement of the F-16 aircraft and will prevail over all other program documents.

Major commitments

The Department of Defense, subject to congressional authorization and appropriations, made the following major commitments regarding the U.S. Government's responsibilities in the multinational program.

1. Procure 650 F-16 aircraft and base a large number in Europe.
2. Manage the F-16 multinational program.
3. Utilize depot maintenance and overhaul facilities established and funded by EPG and industry in these countries on a mutually agreed basis for USAF F-16 aircraft operated in Europe.
4. Release most elements of the F-16 aircraft for technology transfer except certain specific ones that will be released later.
5. Provide for EPG industrial participation in F-16 production to offset EPG procurement costs. Production and assembly contracts are to equal 58

percent of the procurement value of the 348 EPG aircraft purchases with additional offsets in the event of third country sales. Based on the receipt of reasonably competitive prices, the Department of Defense will direct the F-16 contractors to place with EPG industry

--10 percent of the procurement value of the 650 U.S. F-16 aircraft program purchases,

--40 percent of the procurement value of all EPG F-16 aircraft program purchases, and

--15 percent of the procurement value of all third country F-16 aircraft program purchases.

EPG representatives made the following important commitments for their governments.

1. Purchase 348 F-16 aircraft.
2. Pay for all material and services necessary to their program, and fund a pro rata share of the program costs as required for acquiring production long-lead items and production implementation.
3. Pay a pro rata share of U.S. Government nonrecurring costs for developing the F-16 aircraft system.
4. Fund development and production costs for equipment peculiar to their aircraft.

In addition to these major commitments, MOU established a not-to-exceed unit price of \$6.091 (fiscal year 1975) million for EPG aircraft.

In conjunction with MOU, each EPG signed a separate preliminary contract with the United States. These contracts included prices and payment schedules, the initial European financial commitments, performance specifications, planned delivery schedules, and the basic F-16 configuration requirements. These contracts remained in effect until the Letters of Offer and Acceptance were signed during the first week of May 1977.

PARTICIPANTS' RESPONSIBILITIES

The U.S. Government is responsible for the overall management of the multinational program. Other key elements to this management are the F-16 Steering Committee and the F-16 prime contractors.

U.S. responsibilities

Although the F-16 multinational program contains unusual provisions for coproduction, it uses the foreign military sale procedures that call for selling the aircraft on a government-to-government basis. The aircraft will be built by the European subcontractors for General Dynamics which will transfer them to the U.S. Government. The U.S. Government will then transfer them to the purchasing EPG. The United States will also be responsible for meeting the conditions of the Letters of Offer and Acceptance.

The F-16 program is managed by the F-16 System Program Office, Aeronautical Systems Division, Air Force Systems Command. The program office monitors and directs the performance of the prime contractors and coordinates the international aspects of the program through the Multinational Fighter Program Steering Committee.

To provide management in Europe, a combined contract administration and program office support organization has been established in Brussels, Belgium.

Steering Committee responsibilities

MOU established a Multinational Fighter Program Steering Committee composed of one principal member and one alternate member from each participating nation. This committee meets periodically to resolve multinational issues and provide advice to the USAF SPO Director. If the Steering Committee is unable to reach an agreement, the U.S. Secretary of Defense may be asked to resolve the issue.

The Steering Committee has established subcommittees to monitor specific areas and make recommendations for resolution of disputes.

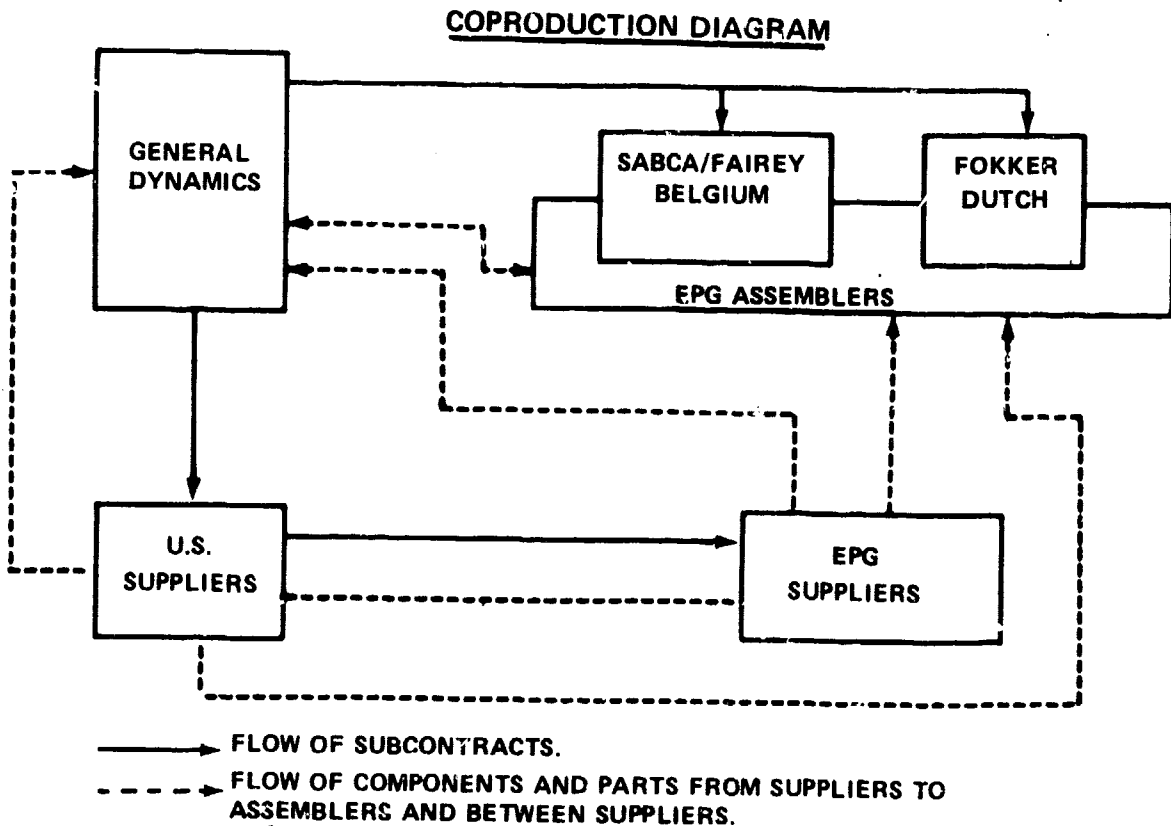
The Steering Committee has also set up a full-time permanent Secretariat in Brussels, Belgium.

Prime contractors' responsibilities

General Dynamics Corporation is the prime contractor for the F-16 airframe. It is responsible for the design, development, and production of all F-16 aircraft and, except for engine performance, for total system performance, including all airframe coproduction work. Pratt & Whitney, the engine prime contractor, is responsible for all F100 engine performance, including those engines assembled in

Europe. Each prime contractor is responsible to the U.S. Government for achieving specific levels of EPG coproduction.

General Dynamics' subcontractors are also establishing coproduction programs with EPG industries for aircraft components. Under existing arrangements, these parts will be used for U.S., EPG, and third country aircraft. The European subcontractors will supply components and parts to General Dynamics subcontractors, European F-16 aircraft assemblers and manufacturers, and also directly to General Dynamics. The following chart identifies the relationship of the contractors and the flow of components.



The General Dynamics F-16 Program Office at Fort Worth, Texas, will provide overall guidance and direction for the EPG program. There is a General Dynamics F-16 Program Office in Brussels, Belgium, with customer support and production divisions. Pratt & Whitney will manage the F100 engine program through the Government Products Division, West Palm Beach, Florida, and a Program Office also in Brussels, Belgium.

MULTINATIONAL PROGRAM STATUS

Since the MOU, signed in June 1975, progress has been made in getting EPG production underway. Issues regarding radar coproduction have been resolved, and the Letters of Offer and Acceptance have been signed. Unanticipated problems delayed EPG subcontract awards and have required changes to the initial manufacturing plans.

The majority of EPG contractors have started F-16 work. This includes the construction of new facilities calling for significant capital expenditures, initiation of training programs, and buying and installation of tooling. In some cases, EPG companies have begun initial production activities. During our recent trip to Europe, both EPG and industrial officials indicated that they are fully committed to the F-16 program and will be expending significant funding and industrial capabilities in their respective countries in the future.

Coproduction plan

The United States is committed to offset EPG procurement costs for EPG F-16 production. General Dynamics, their U.S. suppliers, and Pratt & Whitney have established plans to meet their coproduction commitments. Under the General Dynamics coproduction plan there will be two F-16 assembly lines in Europe, each assembling 174 aircraft. These assembly lines will be operated by VFW-Fokker in the Netherlands, and Fairey and SABCA in Belgium. Fabrique Nationale in Belgium will assemble all European F100 engines. In addition to the aircraft and engine assembly effort, the EPG subcontractors will manufacture some airframe and avionics components. All aircraft and engine components are also manufactured in some quantity in the United States.

Changes in manufacturing plan

General Dynamics, as prime contractor, will assist EPG coproducers in their initial production startup by providing parts, subassemblies, and components until their parts

fabrication can sustain their assembly lines. The initial plan was for General Dynamics to assemble the first two EPG aircraft at Fort Worth, disassemble them, and ship one to Fairey/SABCA and one to VFW-Fokker. These manufacturers would then reassemble them on their production lines. All subsequent EPG aircraft were to incorporate some EPG manufactured parts.

Delays in completing European contracts and getting the production effort started, forced a change to the initial plan. General Dynamics will now manufacture almost all the parts for at least the first 11 EPG aircraft and ship them to Europe for assembly. This procedure is intended to keep the EPG production program on schedule until EPG produced parts are available. These additional requirements will be paid back to General Dynamics by EPG manufacturers later in the program.

General Dynamics will also supply EPG manufacturers with whatever other components they request to maintain their early schedules and maintain a smooth transition to the F-16 program work in their factories. The decision to pay back the U.S. supplied parts will be made on a case-by-case basis. If the parts are not paid back, the coproduction value of that part will be lost. The support requested under this program varies greatly from producer to producer.

F-16 delivery schedule

The EPG program calls for the first EPG F-16 aircraft to be delivered to Belgium in January 1979. Due to longer EPG production leadtime and the delay in the initiation of the coproduction work, the maintenance of this schedule has been difficult. To make sure that EPG deliveries are not delayed, General Dynamics will supply EPG with U.S. parts for the initial aircraft to be assembled in Europe. (See above.)

The following schedule sets out aircraft deliveries through December 1980.

<u>Participating government</u>	<u>Delivery through 1980</u>
The Netherlands	30 aircraft
Norway	14 aircraft
Denmark	16 aircraft
Belgium	30 aircraft
United States	<u>a/</u> 183 aircraft

a/All U.S. aircraft will be assembled at General Dynamics, Fort Worth, Texas.

Award of coproduction contracts

Approximately 52 contracts are presently identified for EPG coproduction. Although it was originally intended that these contracts would be signed by October 1975, the first was not signed until July 1976. As of July 1, 1977, 48 contracts had been signed. These included the two most important--EPG airframe and engine assemblers.

Before these contracts could be awarded, a number of basic differences in EPG and U.S. contractual and business practices had to be resolved. These differences included patent rights, royalties, customs and duties, governing law, cost and pricing requirements, cost accounting standards, progress payments, termination, default, quality control standards, and contract audits. Negotiation of these issues contributed to a delay in awarding EPG subcontracts.

Engineering Change Proposal 0006

On September 30, 1976, General Dynamics submitted Engineering Change Proposal (ECP) 0006--Production Program Baseline--to the F-16 SPO. A purpose of ECP 0006 is to establish firm target and ceiling amounts associated with the EPG program. Furthermore as shown on page 17, the Europeans contend that the contracts contain a not-to-exceed price which contractors are not to breach. We did not have access to the details of this proposal, since it is currently under negotiation. The proposal will incorporate, into the production contract, the majority of changes made to the F-16 design since program award, and reflect some of the impact of EPG participation. We understand that it will probably increase the multinational program cost. The Pratt & Whitney contract is being revised to fit the delivery schedule and option changes in this proposal.

Radar coproduction

The F-16 attack radar contract was awarded to Westinghouse Corporation in November 1975. The original coproduction plan called for extensive radar coproduction, with six major components being manufactured by at least eight EPG producers. It was originally planned that all radar coproduction contracts would be awarded by May 1976. Initial EPG coproduction proposals in February 1976 quoted prices that were much higher than domestic prices and considered unacceptable by program officials.

As a result, the radar coproduction plans were considerably revised, and a plan involving large production runs of a single component by one manufacturer in each EPG nation was proposed. This plan was accepted by the Steering Committee and contracts were signed in February 1977. Although this plan lowers the total dollar value of EPG radar coproduction, SPO officials stated that this approach results in acceptable U.S. and EPG radar prices and offset.

Letters of Offer and Acceptance

The F-16 Letters of Offer and Acceptance (LOA) are bilateral contracts between the United States and individual European governments detailing the purchase and support agreements. At the time MOU was signed, the United States was committed to provide LOAs within 90 days. This schedule proved to be unrealistic. Among other things, delays in completing EPG coproduction contracts and the delay in the award of the F-16 radar development contract resulted in the LOAs not being submitted to EPGs until January 28, 1977.

Following their agreement to purchase the F-16, EPG funded annual program costs on the basis of cost data provided in the preliminary contracts. These funds were not adequate, however, to meet the payment schedules that later appeared in LOAs. Program officials stated that EPG generally had funding shortfalls during early years of the program and were rebudgeted during the later years.

When this problem became known, the United States took the following steps to alleviate the early funding shortages.

- Foreign military sales generally require that the purchasing government prepay sufficient funds to finance the expenses that would be incurred if the buyer terminated the purchase. The Department of Defense waived this requirement for EPG's purchase of the F-16.

--Without prepayment of termination costs, foreign military sales would generally require that the purchasing government pay 100 percent of the incurred contractors cost. The U.S. Government generally pays its contractors progress payments of 80 percent of incurred costs. To reduce EPG payment requirements, the Defense Department will allow EPG to pay the United States on an 80-percent progress payment basis for work accomplished in the United States and 90 percent for work in Europe.

--The EPG will pay the United States \$470,000 (Fiscal Year 75 dollars) per aircraft as their share of the F-16 development costs. This type of development cost recoupment is generally collected at the time the aircraft is delivered. The Department of Defense offered to defer payment of the recoupment on EPG aircraft if desired. Three of them chose to take advantage of this deferral as shown below.

<u>Country</u>	<u>Date of first recoupment payment</u>	<u>Number of aircraft recoupment deferred</u>
Belgium	Jan. 1984	93
Denmark	July 1980	6
Norway	July 1981	14

Program officials stated that EPG will pay interest on the deferred payments. Although the arrangements have not been completed, the interest rate will be tied to U.S. Treasury rates.

During LOA negotiations, other issues were discussed that may have impact later in the program (see pp. 23 and 24). After extensive negotiations, these issues were resolved or deferred, and LOAs were signed by all parties during the first week in May 1977.

OBSERVATIONS

Since MOU and preliminary contracts were signed, the F-16 multinational program has made the following progress.

--The Multinational Fighter Program Steering Committee and Subcommittees have been established to resolve program problems and issues.

- Many differences between EPG and U.S. business practices have been resolved so that substantial coproduction contracting has been accomplished.
- General Dynamics and Pratt & Whitney have developed EPG coproduction plans.
- As of July 1, 1977, 44 of approximately 52 identified coproduction contracts have been signed.
- LOAs have been signed by all four nations.

Progress has not been as rapid as anticipated on the following areas.

- Coproduction contract awards were delayed until resolution of differences in EPG and U.S. contractual and business practices.
- Delays in completing EPG contracts and getting production effort underway have forced a change in the initial manufacturing plan.
- LOAs were signed 18 months after the initial schedule.
- EPG funding was inadequate to meet the payment schedule in the early years of the program. This was caused by the fact that EPG funded annual program costs on the basis of the preliminary contracts which proved inadequate to meet the payment schedules that later appeared in the LOAs.

CHAPTER 3

MAJOR ISSUES

In view of the complexity of the F-16 multinational program, issues and problems are likely to continue to arise as the program matures. This chapter represents brief discussions on some of the major issues that could affect the program cost, schedules, and performance, as well as U.S. relationships with EPG.

REASONABLY COMPETITIVE PRICES

MOU requires the Department of Defense, with the consent of the Steering Committee, to provide EPG industries with coproduction work to offset the procurement cost of their F-16 aircraft. Offset options offered by the U.S. prime contractors will be negotiated into contracts if reasonably competitive prices are received from EPG contractors.

Notwithstanding the limitations of providing coproduction, as called for in MOU, the Steering Committee elected not to establish criteria for determining reasonably competitive prices and decided to have the prime contractor determine the reasonableness of the EPG subcontracts. It has established steps to be taken when a prime contractor does not consider the EPG coproducer's proposed price reasonable.

Under this arrangement reasonably competitive prices are initially the responsibility of the F-16 prime contractors, Pratt & Whitney, and General Dynamics. They are subject to confirmation by the Air Force and the respective participating governments. General Dynamics has established a series of negotiation objectives which are within their contractual not-to-exceed prices for their EPG aircraft (as reflected in MOU). These objectives are being used as target and ceiling prices for negotiating the coproduction contracts. Any contracts which cannot be negotiated within ceiling prices will be brought to the Steering Committee for resolution.

SPO officials agree that EPG-produced parts placed on USAF aircraft will cost more and that inflation, which is known to be higher in Europe, will also be reflected through increased USAF aircraft cost. Although the F-16 will be produced on multiple lines, SPO officials contend that the increase in aircraft procurement quantities, as a result of EPG participation, should lower the cost of domestic production enough to offset the increased cost of coproduction efforts.

Under the present General Dynamics accounting system, it is not possible to assess the difference between EPG and U.S. production costs, nor to determine the additional cost to the United States of incorporating higher priced EPG-manufactured parts in USAF planes. This exists because EPG subcontractors are not required to segregate costs to components produced.

However, two Air Force projections of currently available cost data indicate a cost impact. In the Defense System Acquisition Review III A briefing (long lead production approval) given in January 1977, F-16 program officials identified a possible net cost increase of \$70 million to \$115 million to the USAF production program because of coproduction. An Independent Cost Analysis, also made by the USAF, has indicated an estimated net cost increase for the USAF production program of \$241 million because of coproduction. The estimates assume EPG will be participating in the coproduction of 650 aircraft for the United States.

SIGNIFICANCE OF THE MEMORANDUM OF UNDERSTANDING-ESTIMATED NOT-TO-EXCEED PRICE

MOU not-to-exceed unit price for the EPG F-16s is \$6.091 million in 1975 dollars. This price consists of the following items.

<u>Item</u>	<u>Estimated price</u> (millions)
Airframe	\$3.450
Engine	1.445
Radar	0.372
Government-furnished equipment	0.153
Full-scale development share	0.470
Industry management	0.005
Duplicate tooling	<u>0.196</u>
Unit price	<u>\$6.091</u>

USAF and contractor officials said they do not know if the MOU price will be exceeded because all EPG subcontracts

have not been awarded. A definitive cost estimate should be available after USAF, General Dynamics, and Pratt & Whitney complete negotiations of major program baseline changes now scheduled for August 1977.

There is no common understanding of the meaning of the not-to-exceed price of \$6.091 million for EPG aircraft. U.S. officials consider this to be an estimate and a critical goal to be achieved, which cannot be guaranteed by the U.S. Government. EPG looks upon the price as a firm commitment laid down in the MOU and made by the U.S. Government, which expressed its confidence that the not-to-exceed price could not be exceeded. While recognizing that the U.S. Government cannot legally guarantee the not-to-exceed price, EPG considers that this price was provided with approximately 90 percent of its content, covered contractually by the airframe and engine contractors. The consequences of a breach would be very significant and would have grave political impact on EPG. In the event that the price is exceeded, the matter would be taken to the Steering Committee. The interpretation of the meaning of the not-to-exceed price could be an issue for future resolution, if there is unforeseen cost growth.

At this point it is not known if the not-to-exceed price will be exceeded. However, we believe that it is not realistic to attempt to establish not-to-exceed prices at a point very early in any acquisition program. The history on acquisitions of other major weapon systems shows that unforeseen problems always occur, resulting in cost increases. In the case of the F-16, changes to the aircraft are currently being negotiated to adjust the fixed contract price. Further, the contract is being modified to provide for other items and tasks that were not fully defined at the time of contract award. These negotiations, along with the prices established earlier, will be the basis for establishing the prices EPG will pay for the aircraft.

TREATMENT OF ECONOMIC ESCALATION

The U.S. prime contracts have provisions for economic fluctuations. Although EPG economic indexes should have been submitted in October 1975, the first segments were not received until June 1976. It was October 1976 before enough information had been received to permit the United States to compile the indexes and submit them to Europe for confirmation. The indexes provided by EPG are being verified through F-16 SPO consultation with EPG and by review of the source documents. We were denied access to these economic escalation projections because EPG felt they were sensitive.

In July 1976 General Dynamics began awarding EPG coproduction subcontracts. Since the Program Office's assessment of the indexes was incomplete, the first EPG subcontracts state that the indexes, as agreed upon by the governments, will be added later.

For the F-16 program, the agreed upon economic indexes in the U.S. prime and EPG subcontracts will represent normal economic escalation. Any escalation above the indexes will constitute abnormal economic escalation. Regardless of where the aircraft parts are made, each country will pay for normal and abnormal escalation associated with the aircraft it buys. For instance, the U.S. Government will pay for the cost of economic escalation for the U.S. prime contractors and each EPG subcontractor whose parts are used in assembling the USAF F-16. If the EPG normal and abnormal economic escalation rate is greater than the U.S. rate, the higher escalation rate could increase the cost of the portion of the USAF F-16s EPG will coproduce.

Until EPG economic indexes are approved and actual escalation, both for Europe and the United States, is compared with the indexes, it will be impossible to determine the impact of EPG and U.S. escalation on the cost of USAF F-16s.

CURRENCY EXCHANGE RATES

MOU requires the Steering Committee to prepare currency exchange procedures on the basis of the principle that neither the U.S. contractors nor EPG subcontractors shall realize financial benefit or incur financial loss as a result of fluctuations in the official rate of currency exchange. A USAF task force is formulating detailed currency and payment guidelines for the F-16 multinational effort which are being coordinated with the Treasury Department. The basic concepts have been discussed with EPG and accepted by the Steering Committee on October 18, 1976.

Although details are still being completed, the Steering Committee agreements established three different currency baselines:

- Contracts for the U.S.-manufactured parts for EPG aircraft will be priced in U.S. dollars, and payment to the United States by EPG will be in U.S. dollars.

--Contracts for EPG-manufactured parts for the EPG will be priced in the applicable U.S. and European currency at the fixed official exchange rate established by the Steering Committee. EPG will acquire the required mix of currencies at the prevailing exchange rates for deposit in a U.S. Government-managed European account for currency exchange.

--Contracts for EPG manufactured parts for the USAF F-16s will also be priced in an applicable mix of U.S. and European currency at the fixed exchange rate established by the Steering Committee. The United States will acquire the required mix of currency at the prevailing market exchange rates and will deposit these currencies to the U.S. Government-managed accounts in Europe for currency exchange.

It is possible that either the United States or EPG may gain or lose from such an arrangement. The United States can only be adversely affected on that portion of the program where it has to pay EPG for producing F-16 parts for USAF aircraft. The United States will have to pay EPG in local currency, and it will have to obtain this currency at the market or floating exchange rate. The impact of inflation on the currency exchange must also be considered in any currency exchange analysis. However, we have not been able, as of yet, to obtain EPG inflation estimates.

EPG DEPOT MAINTENANCE FOR USAF F-16s

MOU provides that the U.S. Government will use EPG depot level maintenance and overhaul facilities on a mutually agreed basis for USAF F-16 aircraft operated in Europe. The U.S. and EPG have not reached a final agreement concerning the extent that European industries and facilities will be used in the overhaul of F-16 components. Matters to be considered include

- which countries will perform aircraft depot maintenance on United States Air Force in Europe (USAFE) F-16 aircraft,
- out of 200 candidate assemblies/subassemblies, which ones will EPG repair and which country will perform the work, and
- will EPG overhaul the USAFE F-16/F100 engines?

Department of Defense officials have stated that EPG will perform F-16 depot maintenance as provided for in the MOU, only if it is cost effective. One EPG, however, considers that the U.S. Government has a commitment to overhaul F-16 components in Europe. The extent of EPG depot maintenance of U.S. F-16s, its cost effectiveness, and EPG's satisfaction with their share of the workload are issues for future resolution.

EPG PRODUCTION PROBLEMS

EPG industries may have problems meeting the production requirements of the F-16 program. Coproduction efforts are behind schedule due to the delay in awarding EPG contracts. The EPG subcontractors' capabilities to recover this schedule slippage, and others which may occur during production, may be hampered by labor restrictions. EPG tax structures and national law generally limit the amount of overtime that can be performed. Use of overtime is not favored because the unions view it as a means of reducing the number of employees. In addition, the use of second and third shift operations is restricted. As a result, leadtime for EPG production is greater than for U.S. production and the ability to readily increase production is very limited.

Because of these labor restrictions, increased production rate may require additional tooling to enable a larger number of workers to be active at the same time. Such tooling would increase the cost of additional production, and F-16 program officials stated that EPG will not add tooling unless the United States will guarantee that it will be fully used for a significant length of time.

To prevent late deliveries of EPG-produced parts and aircraft, General Dynamics plans to send U.S.-produced parts to assemblers if EPG parts are late. These parts may then be paid back to the U.S. manufacturer late in the EPG production run to be used in USAF aircraft. This procedure may be used to compensate for the initial program delays (see p. 10) and to avoid any subsequent late deliveries. The decision to pay back U.S. supplied parts will be made on a case-by-case basis. If the parts are not paid back the coproduction value of that part will be lost.

This substitution procedure assumes that U.S. manufactured components will be readily available for shipment with minimal impact on USAF schedules and that delivery delays will be identified in time to permit shipment of a substitute component to Europe without further delaying production. The General Dynamics' Air Force Plant Repre-

sentative Office's (AFPRO) survey of EPG F-16 coproducers, made in 1976, indicates that accurate information on schedule status was difficult to obtain and in some cases may not have anticipated delays. However, EPG believes the establishment of a Contract Administration Service Office in Europe, prime contractor European offices and the extensive use of production readiness reviews will enable them to provide accurate schedule information.

If extensive substitution occurs, the EPG subcontractors may be unable to produce timely replacements for U.S. industry. In turn, this could jeopardize the offset commitments. The substitution procedure, while limiting or preventing EPG schedule slippages, may have some impact on the cost of USAF and EPG aircraft. The substitution's impact on the cost of USAF aircraft will depend on the comparative costs of the U.S. and EPG parts, including the cost of possible escalation, additional transportation cost, and the cost of possible U.S. schedule disruptions associated with the initial parts substitution and subsequent replacement.

Since EPG schedules, not U.S. cost considerations, are the basis for substituting parts, there is no assurance that the substitution of parts will not increase the cost of USAF aircraft.

A 1976 study of EPG F-16 coproducers, made by the General Dynamics AFPRO, indicates that EPG manufacturers may also encounter quality assurance problems.

USAF has indicated to us that concerns expressed in the AFPRO report regarding the adequacy of EPG quality assurance standards versus MIL-Q-9858A (the U.S. quality assurance standard) have been substantially removed by negotiating portions of the U.S. standard into the contractual agreements. In addition, extensive production readiness reviews by SPO expert teams have verified that manufacturing processes, work instructions, and quality control procedures are developed by the U.S. producer and furnished by contract, to the EPG coproducer. The EPG coproducers are contractually required to follow these planning documents. Since U.S. quality assurance procedures are based on MIL-Q-9858A (the U.S. Standard), there is some concern remaining in the quality assurance areas in regard to the learning necessary in any new program startup.

In our recent visit to EPG and F-16 European industrial plant locations, it was found that significant

effort has been and is being made to establish U.S. quality assurance standards on their F-16 production. In all the industrial establishments visited, there was considerable experience in quality assurance programs, and in the majority of these companies there had been previous acquaintance with U.S. quality assurance concepts. The only problem identified was the impact that these companies have encountered in using the U.S. administrative procedures, but not in meeting the U.S. standards. It must be pointed out that EPG companies are in the initial stages of the production effort, and a true assessment of the quality assurance on EPG F-16 program must wait until full production is reached.

COPRODUCTION OFFSET

As discussed in chapter 2, the F-16 MOU commits the United States to provide definite levels of coproduction offset to EPG consortium. As actual coproduction contracting progressed, fundamental issues were raised concerning the distribution and definition of offset. Satisfactory achievement of offset goals could depend on the resolution of those issues.

Offset distribution

Under the MOU arrangements, the U.S. will provide production offset to EPG, initially equal to 58 percent of the procurement value of the European purchases for a 1,000 aircraft program. The MOU offset commitment is to the EPG consortium as an entity. There is no U.S. responsibility to distribute offset among the EPG nations.

At the request of EPG, an assessment by the F-16 SPO of the relationship between offset and procurement value for the consortium as a whole and a separate assessment for each EPG was prepared. It indicated that the 58-percent commitment to the consortium would be met, but that offset was not distributed, according to each country's investment in the program.

Although SPO offset projections were based on partial data, they showed that the northern countries would receive substantially less than 58 percent of their procurement value in production work. Belgium, however, would receive considerably more than the dollar value of its purchase. This situation caused concern during the negotiations surrounding LOAs, as the northern countries, particularly Denmark, attempted to assure a balanced distribution of remaining coproduction contracts.

Program officials stated that EPG understand that the coproduction commitment applies to the consortium as a whole. Although the United States has no responsibility for specific country offset distribution, SPO, as program manager, will work toward a more balanced offset distribution as long as there is no impact on program cost or schedule. Therefore, requests for contractor proposals on F-16 flight simulators and avionics intermediate shop equipment stipulate that coproduction proposals should be primarily sought from Denmark and Norway.

Definition of offset

Offset is the value of orders placed with EPG industry minus the value of any parts or materials EPG is specifically directed to purchase within the United States. This value, when divided by the procurement value of EPG F-16 purchases will give the offset percentage figure to be compared to MOU criteria. Although there is agreement on this method of calculating offset, there is no agreement yet on the definition of two important elements of the equation.

Procurement value

MOU defines the program cost categories that will make up EPG F-16 procurement value. Various program elements are not included in this calculation, and therefore, do not have to be offset.

F-16 program costs are contained in LOAs signed in May 1977. LOAs are divided into 41 specific aspects of program costs called cases. Each case is separately defined and priced. For initial tracking of offset goals, SPO will use the dollar values cited in the applicable LOA cases. The LOA cases, however, do not necessarily match the procurement value categories in MOU.

Before EPG procurement value can be defined, the United States and EPG must determine what is included in each of the MOU cost categories, and agree on how those items are priced in LOAs. The higher the procurement value, the higher the value of EPG contracting required to offset it.

Specifically directed purchases

Before the offset value of contracts awarded in EPG can be established, a decision must be reached on how to treat money spent in the United States by EPG coproducers. MOU provides that if EPG producers are specifically directed to

purchase required parts or material from the United States, then the value of those items will not be counted as offset. MOU does not address instances where the only existing source for an item is in the United States, or where the cost of qualifying a new source would be prohibitive. Depending on the technology or the cost, certain items required by EPG F-16 subcontractors will have to be purchased in the United States even though they are not specifically directed in the purchase orders.

The United States and EPG must negotiate a satisfactory definition of what is a specifically directed purchase. If all money spent by EPG contractors in the United States were considered specifically directed, then EPG offset value would be considerably reduced, and further coproduction contracting might be necessary if MOU commitments are to be met.

The coproduction offset commitments are one of the major reasons EPG purchased the F-16. Successful accomplishment of offset goals will be a primary criteria for judging the success of the multinational program. Although the majority of F-16 contracting has already been completed, negotiation of these coproduction issues will undoubtedly result in pressure on the United States to increase EPG participation. The United States should ensure, however, that any additional coproduction does not have an impact on program cost or schedule.

Furthermore, despite the importance of the coproduction commitment, there is currently no system to routinely determine if EPG subcontracts will meet the initial MOU requirements for EPG production goals. A management system for identifying and tracking data relative to these goals is being developed, but no status information is currently available. If this system shows that requirements are not being met, the United States would have to consider indirect offsets (i.e., EPG production of an equivalent value of non-F-16 items) to make up the difference.

OBSERVATIONS

Many of the problems and issues highlighted in this chapter have the following potential effect to the United States under the F-16 multinational program.

- EPG produced items, necessary to meet offset requirements, are expected to be more costly than domestically produced components.

- Higher EPG escalation rates could increase USAF F-16 cost.
- EPG production problems which result in schedule slippage and parts substitution could lead to higher costs.
- The United States and EPG will assume any risk or benefit from any fluctuations in foreign exchange rates to prevent losses or gains by contractors.
- If costs exceed the estimated MOU not-to-exceed price EPG will bear the actual program costs, but significant political consequences could result.

At the present, it is very difficult to assess how the EPG participation in the program will affect the cost of F-16s to the United States. Although SPO is developing a F-16 cost estimating system that includes coproduction and assesses the coproduction cost impact on USAF aircraft, it cannot presently assess these elements.

Some problems and issues could influence the relations with EPG.

- Coproduction manufacturing problems could result in difficulties in meeting offset commitments to EPG.
- The extent of EPG depot maintenance of USAF F-16s will depend on how cost effective it is. If they are not price competitive, USAF may consider other alternatives, including domestic depot maintenance, which may cause dissatisfaction with EPG.
- Resolution of issues regarding coproduction definition and distribution will result in pressure to increase EPG manufacturing participation and may lead to dissatisfaction with offset arrangements.

CHAPTER 4

OUTLOOK

The common objectives of the United States the EPG under the F-16 multinational program are to acquire a low-cost fighter aircraft and standardize the weapon systems in NATO. Additional objectives of EPG are to acquire advance technology and make optimum use of EPG resources in producing F-16 aircraft.

At this time it is too early to predict how successful this program will be in producing a low-cost aircraft and the benefits it will provide through standardization among five NATO nations; however, the problems discussed earlier could affect the achievement of program goals. This chapter discusses the outlook for the multinational program in terms of the participants' objectives.

ACQUISITION OF LOW-COST AIRCRAFT

Both the United States and EPG want to obtain a low-cost aircraft. Europeans consider the MOU not-to-exceed price of \$6.091 million (1975 dollars), which includes research and development recoupment and coproduction, as their criteria; USAF has established a unit recurring flyaway design-to-cost goal of \$4.55 million (1975 dollars). This does not include the effect of coproduction since the Europeans had not selected the F-16 as their replacement aircraft at the time the design-to-cost goal was established.

Presently, USAF estimates that the last coproduction subcontract will probably be awarded between August and September 1977. At that time more realistic prices based on known data, will be available and USAF will be able to determine the accuracy of the not-to-exceed prices.

The USAF design-to-cost goal was originally based on 100-percent U.S. production of 650 F-16s. Before the January 1977 DSARC IIIA briefing, no provision had been made to reflect the cost impact of EPG in the manufacturing of USAF aircraft. In its briefing to DSARC, SPO estimated this impact could be \$70 to \$115 million, but might be reduced by application of management techniques. An Independent Cost Analysis, also conducted by USAF, indicated a cost impact of \$241 million.

In conjunction with the DSARC IIIA decision, USAF reconfirmed the F-16 design-to-cost estimate of 4.55 million

dollars, including the effect of EPG coproduction. At the same time it was stated that the F-16 program would be managed in such a way that the cost increases from coproduction in Europe will be no greater than the savings resulting from the larger domestic production run requirements to meet EPG aircraft.

As discussed in chapter 3, we believe that several factors relating to the coproduction commitment could increase the cost of USAF F-16s. USAF has no financial management system that accurately estimates the cost of 650 USAF F-16s being produced under the multinational program. A cost system, which will provide the final quantitative impact of EPG coproduction is being finalized by the F-16 SPO and is scheduled to be completed by the summer of 1977. Until such a program is operating it will not be possible to determine the coproduction cost impact, or to determine if the \$4.5 million design-to-cost goal is realistic.

During our recent trip to the EPG, there was considerable interest in obtaining realistic cost data on the EPG cost of the aircraft. EPG said it was difficult to keep track of the cost data on such a complex program because of the multinational arrangement, and recommended that any system developed by the USAF or the prime contractors consider the need to make available sufficient data for them to track aircraft price.

STANDARDIZATION OF NATO AIRCRAFT IMPROVED BY F-16 PROCUREMENT

The more nations which acquire the same weapon system, the more effective the combat capability of NATO forces, and the more economical and efficient the training and logistics. Congress has endorsed and supported the resurgence of emphasis on the subject of standardization in NATO, and the Department of Defense has established direction implementing this policy. The European members, organized into the independent European Program Group, including France, have called for a two-way street in defense trade, and because of economic and political necessity, are moving toward coproduction of any U.S. designed system.

Numerous NATO standardization programs are currently being negotiated. These programs include tanks, ships, ammunition, missiles, and advanced communications equipment. European industrial participation is an important question in several of those programs. The planned procurement of the F-16 by the United States and the four European countries

is a significant step toward standardization of NATO aircraft. Since the F-16 multinational program is the first coproduction program of this size and complexity, NATO officials are watching to see if the coproduction problems can be resolved and the offset commitments met.

The prospects for future standardization between U.S. and European nation's would be greatly enhanced if the F-16 coproduction proved successful.

The F-16 configuration baseline is reflected in the prime contract with General Dynamics. In order to control the configuration and maintain standardization, MOU provides that all parties are to avoid changes to the F-16 unless they are indispensable and cost effective. EPG identified peculiar optional requirements for their aircraft that were deviations to this baseline. Some requirements, such as the radar picture freeze, the radar sea clutter elimination, and the autopilot-altitude hold, have been adapted by USAF in the interest of standardization and are now common requirements. EPG has likewise accepted U.S. proposals in the interest of standardization such as the high technology ejection seat.

Standardization between the U.S. and EPG F-16s will require constant evaluation to make sure that this goal is attained with cost effectiveness and without sacrificing needed performance.

Use of JP-8 Fuel in the F-16

Based on a July 20, 1976, memorandum from the Deputy Secretary of Defense, the F-16 SPO and the Joint Engine Project Office have directed General Dynamics and Pratt & Whitney to conduct feasibility studies on the use of JP8 fuel (commercial airliner fuel) for F-16 aircraft and F100 engine. The use of JP8 is being considered because it is the NATO standard jet fuel and would be more accessible for use in Europe in emergency situations. At this time it is too early to assess the feasibility and performance impact of the use of JP8 in the F-16 aircraft and the F100 engine.

TRANSFER OF ADVANCED TECHNOLOGY TO EPG

MOU provided that EPG industries would acquire data, technology, technical assistance, and material relating to the F-16 aircraft, including the right to use them for production within the framework of the F-16 program in the four EPG countries.

The U.S. Government agreed to assist EPG in obtaining technical information and user rights from U.S. industries. Except for limiting the transfer of specific technical data due to security restrictions, the U.S. Government agreed to transfer its data rights to the European Governments and/or industries. This will result in technology transfer throughout the life of the program. But there are several reasons the agreement has encountered problems.

- In the case of the F-16 program the U.S. Government does not own all the data rights.
- A General Dynamics subcontractor may elect not to transfer the proprietary data to EPG. For instance, we found that Goodyear Aerospace did not have EPG coproduce the carbon disk pack, a brake system component, because that item was developed with corporate funds and was proprietary. Under MOU arrangements, a subcontractor's refusal to transfer proprietary data may influence the complexity of the work assigned for coproduction.
- A General Dynamics contractor or subcontractor cannot transfer data rights that it does not own to EPG. For example, an electronics firm may use a micro-mini circuit in its design which it may have purchased from a vendor. Since it did not own this device, the electronics firm could not transfer the micro-mini circuit data rights to EPG.
- Another factor which inhibits the transfer of manufacturing data is the problem of manufacturing parts which will meet precise specifications at a competitive or reasonably competitive price. For instance, after the prime contractor approves the final design configuration, the subsequent manufacturer of that item must purchase components from the qualified parts list vendors or bear the cost of qualifying its own vendors. This latter option assumes that the manufacturer has sufficient technical data to actually produce the part. A General Dynamics subcontractor stated the qualification of vendors is costly, and for a small production quantity is cost prohibitive. For small production quantities, EPG subcontractors will probably have to buy parts from General Dynamics or its qualified sources.

--Even if EPG were provided the technical data rights, they may not have available manufacturing capability to coproduce the item.

At this time it is not clear how extensive transfer of technology to EPG industries will be. According to SPO officials, there is no major problem with technology transfer because EPG has understood most of the limitations and has no major complaints. This may be the best criteria for judging success in accomplishing this EPG objective.

EPG COPRODUCTION LIMITATIONS

A favorable coproduction commitment was one of the major factors EPG used in selecting the F-16. In MOU, the U.S. Government agreed to place specific coproduction commitments in F-16 contracts.

EPG has incorporated their F-16 commitments into their long-term budgets. They also had to purchase and install tooling, initiate training programs, build facilities, and in some cases, initiate early production activities to meet the F-16 schedules. Any major changes to the present program will have a severe impact on EPG and their participating industry. It is very difficult for EPG to change their budgets to accommodate major program alterations. Its industry is limited by national law, tax structure, or labor restrictions to significant temporary increases or decreases to its manpower levels. In turn, overtime is limited by social laws and this restricts its use to compensate for schedule changes. Since the F-16 will represent a significant part of many of the companies involved in the program, any major change to the program would be difficult to compensate and cause serious economic problems.

EPG assembly facilities are fully committed, through 1984, with a maximum production of six aircraft a month, three for each line, through 1983. The above mentioned restrictions could prevent timely EPG participation in additional F-16 sales. Currently, USAF proposes to sell 160 F-16s to Iran with deliveries from mid 1980 to 1983. Under current conditions, EPG industry cannot fully participate in the early phase of this sale. However, MOU provides that EPG produce 15 percent of the procurement value of third country sale. Additionally, Iran reportedly wants to buy 140 additional F-16s, and Israel, Spain, Greece, Turkey, and other countries have expressed an interest in purchasing the F-16 aircraft. Future third country sales, particularly if they are coupled with additional concurrent EPG sales, could make it difficult for Europe to meet the MOU participation commitments.

SPO officials agree that total F-16 sales could surpass EPG industry's ability to participate. They did not know how many F-16 sales, or what combinations of purchases, would be required to reach this point. If sales threatened to surpass EPG capabilities, the issue would be referred to the Steering Committee.

According to SPO officials, MOU provisions require that European industry be offered the opportunity to participate in third country sales. EPG would therefore have to decide whether to improve the utilization of its production capacity, or have its participation in third country sales fall below the MOU commitment.

An additional difficulty in meeting coproduction commitments could be the criteria for reasonably competitive pricing. SPO officials stated that if a particular item cannot be coproduced on a reasonably competitive basis, it will be dropped from the coproduction phase. Such a decision would have to be approved by the Steering Committee.

USAF officials stated that the participation of EPG in third country sales has been discussed in the Steering Committee. It has been agreed that if Europe cannot fulfill its coproduction commitments, there will be consultations among the governments at the Steering Committee. Nonparticipation of EPG in a particular third country sale shall be compensated for by a larger percentage participation in other third country sales. The percentage of compensation will be decided on a case-by-case basis.

The importance of these provisions to EPG has made the coproduction commitments an integral part of the F-16 multinational program. The success of the United States and EPG in coproduction offset commitments could have significant impact on relations with the EPG and future coproduction programs.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

The F-16 multinational program will provide a standard aircraft for five NATO countries and is pioneering a new era in weapons system acquisition by including both U.S. and EPG production capabilities. The program presents complex management and coordination problems for the Multinational Fighter Program Steering Committee and its Subcommittees, the U.S. Government and EPG, the prime contractors, U.S. sub-contractors, and the EPG subcontractors.

Although progress has been made, it is not as rapid as anticipated and a portion of the multinational program is behind schedule. The success or failure of the F-16 program will have a significant influence on the fate of future coproduction programs in NATO, and, in turn, the standardization to strengthen NATO military operations.

We believe the decision to procure and deploy the F-16 aircraft was influenced considerably by the opportunity for NATO standardization and EPG sales. Further, the timeframe for aircraft selection and the major elements of the multinational program have been driven by the EPG participation requirements.

In our opinion, the accelerated pace of activity to meet the EPG delivery schedule has contributed to the following conditions.

- What was essentially a USAF prototype air superiority technology demonstration program, evolved rapidly into a full-scale development program aimed at ultimately producing a new dual purpose fighter for the Tactical Air Command and four European countries.
- Lack of a common understanding of the meaning of the not-to-exceed price of \$6.091 million.
- The timetable for awarding contracts to EPG contractors and completing LOA procedures proved optimistic and slippages occurred.
- The contracts with the U.S. airframe and engine contractors had to be restructured to include revised option quantities and other changes.

- EPG coproducers will apparently be starting the program behind schedule, and it is uncertain if they can ultimately catch up without assistance from the U.S. prime aircraft contractor.
- Agreements are in process to supply Iran with 160 aircraft by 1983, although uncertainty exists as to whether that number of planes in that time period can actually be coproduced as required in the MOU.
- Under the present General Dynamics accounting system, it is neither possible to assess the difference between EPG and U.S. production costs, nor determine the additional cost to the United States of incorporating higher priced EPG-manufactured parts in USAF planes. This is because EPG subcontractors are not required to segregate costs to components produced.
- Potential EPG contractors' production problems have been identified which, if not effectively managed will lead to higher costs and program delays.

The success of the coproduction arrangements appears to depend on EPG industry's production capabilities and responsiveness to schedule requirements. If EPG production delays ultimately result in late deliveries, and if participation requirements from additional F-16 sales exceed production capacity, then EPG countries may not be able to meet their commitments.

These conditions point to a need for close and constant management attention to the F-16 Multinational Program with particular emphasis on the potential for EPG cost growth, production and schedule problems, and the related impact on achieving the agreed to coproduction offset commitments without adversely affecting the cost of USAF aircraft.

EPG has initiated many activities for F-16 production. These activities are based on the MOU commitment. Any changes to the program through funding or schedule limitations will cause a severe impact to the EPG program. EPG industries are limited to changes in schedule by labor restrictions, industrial capacity, and funding changes.

In this environment any congressional changes in the F-16 program that would have an adverse impact on schedules

and/or costs would cause severe industrial repercussions in EPG producing the F-16, and could affect U.S. relations with these nations.

Any sizeable cost, production, or schedule problem in EPG production could easily disrupt the planned coproduction effort. This could result in either the EPG contractors producing smaller quantities or cost increases and delays in the USAF program.

The F-16 program will provide the opportunity to evaluate the potential for future coproduction programs and to identify problems and solutions in implementing such multinational agreements.

RECOMMENDATIONS

We recommend that the Armed Services and Appropriations Committees carefully explore the impacts on schedules and costs of any proposed U.S. funding changes, especially as they affect EPG.

International competition for future acquisitions of major weapons systems may require the use of price quotations by U.S. negotiators early in an acquisition. We recommend therefore, that particular care be taken to avoid use of NTE prices and to avoid any implication that changes are unlikely.

We also recommend that the Secretary of Defense instruct the Secretary of the Air Force to closely monitor:

- The development of a cost accumulation and estimating system that will accurately show the effect of EPG coproduction on USAF aircraft costs and on the EPG not-to-exceed price.
- The development of a system for monitoring progress in accomplishing MOU offset commitments, both in terms of dollar value and quantities of equipment items.

DOD recognizes the need to track these items and the Air Force is currently working to establish accounting procedures to meet these objectives.