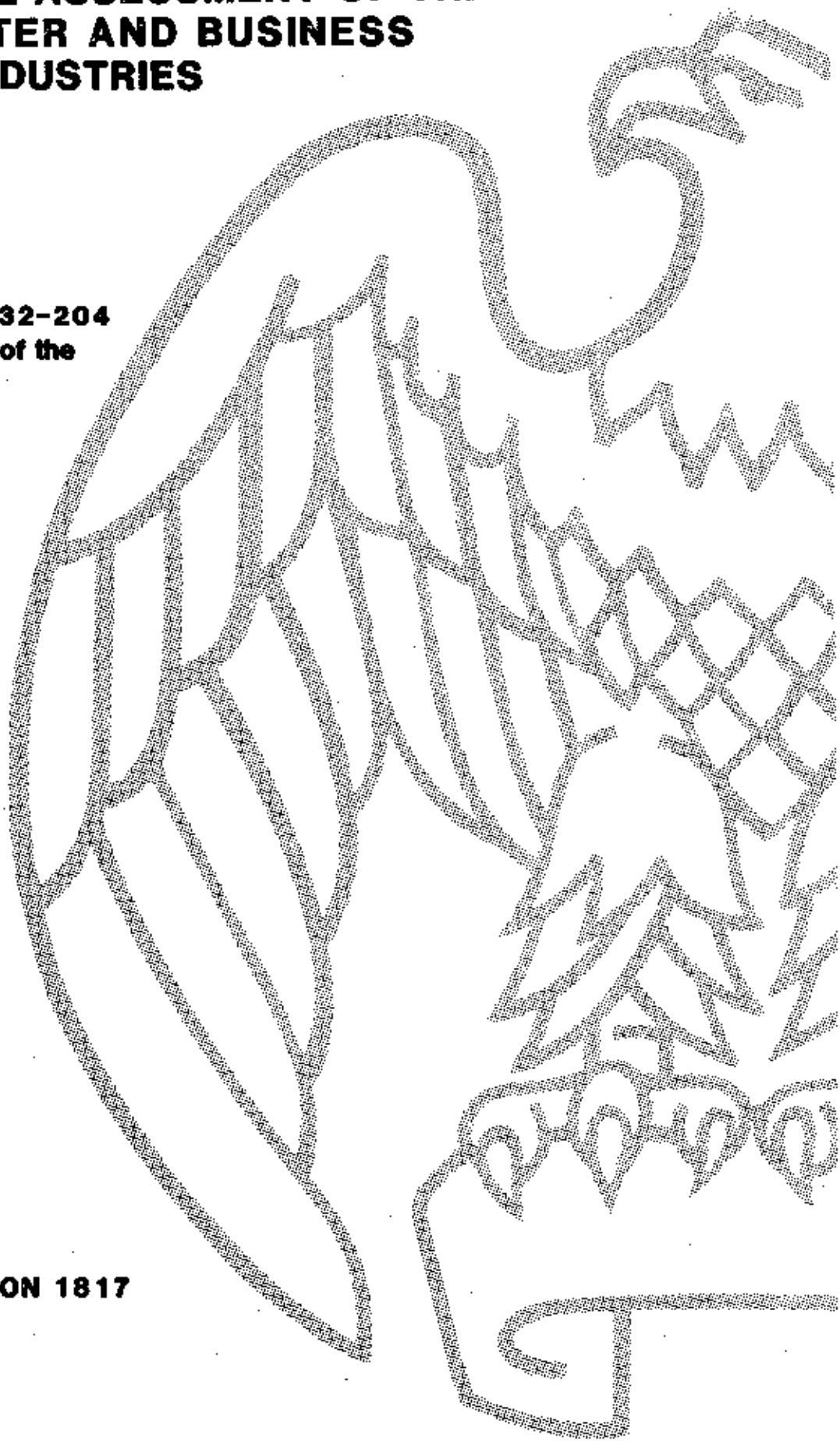
COMPETITIVE ASSESSMENT OF THE U.S. COMMUTER AND BUSINESS AIRCRAFT INDUSTRIES

Report on
Investigation No. 332-204
Under Section 332 of the
Tariff Act of 1930



USITC PUBLICATION 1817

MARCH 1986

United States International Trade Commission / Washington, DC 20436

UNITED STATES INTERNATIONAL TRADE COMMISSION

COMMISSIONERS

Paula Stern, Chairwoman
Susan W. Liebeler, Vice Chairman
Alfred E. Eckes
Seeley G. Lodwick
David B. Rohr
Anne E. Brunsdale

This report was prepared principally by

Deborah Ladomirak, Project Leader,
Diane Manifold, and William Greene

Machinery and Equipment Division

Laurie Cameron, Office of Economics

Office of Industries
Erland H. Heginbotham, Director

Address all communications to
Kenneth R. Mason, Secretary to the Commission
United States International Trade Commission
Washington, DC 20436

Preface

On January 9, 1985, on its own motion and in accordance with section 332(b) of the Tariff Act of 1930 (U.S.C. 1332(b)), the United States International Trade Commission 1/ instituted investigation No. 332-204, Competitive Assessment of the U.S. Commuter and Business Aircraft Industries. The study assesses the factors affecting the present international competitive position of U.S. producers in domestic and foreign markets, compares structural characteristics of the U.S. industry and foreign industries, and examines the extent of government involvement in the world market.

Notice of the investigation was given by posting copies of the notice of investigation at the Office of the Secretary, U.S. International Trade Commission, Washington, DC, and by publishing the notice in the Federal Register (50 F.R. 3036, Jan. 23, 1985) (app. A). Although no public hearing was originally scheduled in this investigation, the Commission, on July 11, 1985, at the request of an importer of business aircraft, scheduled a public hearing on this matter. The hearing was held on August 27, 1985, in the Commission's hearing room in Washington, DC. Notice of the public hearing was given by posting copies of the notice of scheduling of a public hearing at the Office of the Secretary and by publishing the notice in the Federal Register (50 F.R. 30244, July 24, 1985) (app. A). Those persons who testified at the public hearing are identified in app. B.

In the course of this investigation, the Commission collected data from questionnaires received from 9 producers, 17 importers, and 153 purchasers of commuter and business aircraft. In addition, information was obtained from published sources, from questionnaire responses prepared by overseas posts of the U.S. Department of State, from interviews with corporate executives representing producers, importers and purchasers of commuter and business aircraft, from the Commission's files, and from other sources.

The information and analysis in this report are for the purpose of this report only. Nothing in this report should be construed to indicate how the Commission would find in an investigation conducted under other statutory authority covering the same or similar matter.

1/ Commissioner Anne E. Brunsdale was sworn in on Jan. 3, 1986, and did not participate in this investigation.

C O N T E N T S

CONTENTS

CONTENTS

Figures

Tables

CONTENTS

CONTENTS

Executive Summary

The U.S. commuter and business aircraft industries are extremely concerned about the decline in their competitiveness in domestic and foreign markets in recent years. During 1980-84, the value of overall domestic shipments fell, as did exports, capacity utilization, and employment. The declines were generally attributed by industry sources to the U.S. recession and strong competition from foreign manufacturers.

The purpose of this study is to assess the factors affecting the present international competitive position of U.S. producers in domestic and foreign markets, to compare structural characteristics of the U.S. industry and foreign industries, and to examine the extent of government involvement in the world market. The major findings of the study are summarized below.

o U.S. producers' sales declined significantly during 1981-84.

In 1981, U.S. sales of commuter and business aircraft totaled $2.1 billion, with exports accounting for another $765 million. The United States, with the world's largest general aviation manufacturing base, supplied over three-quarters of world shipments in that year. Domestic sales, however, decreased sharply during 1982-84, by 77 percent in quantity and 23 percent in value. Combined U.S. and export sales totaled only $1.9 billion in 1984. Business aircraft averaged 94 percent of total shipments' value in 1980-84; the share of commuter aircraft shipments increased from 3 percent in 1981 to 9 percent in 1984, as average aircraft size increased and unit sales rose. Overall physical capacity utilization for these industries declined from 70 percent in 1981 to 18 percent in 1984 (see pp. 8 and 17).

o Some evidence points to a severe slump in demand as the main reason for the decline.

Shift-share analysis 1/ of unit sales would attribute over 90 percent of the decrease in U.S. producer sales worldwide to an overall decline in demand, with the remainder of the decrease due to a loss of market share to foreign competitors. This analysis, however, was only on a unit basis, and therefore could overstate demand effects because of the marked increase in the unit value of aircraft shipments, especially in the commuter aircraft sector. Factors in the decline in total demand for commuter and business aircraft include the general slowdown in U.S. economic growth, aggravated by high interest rates, and the impact of a high dollar raising U.S. export prices and lowering the price of imports. In the United States, data indicate that aircraft sales follow changes in gross national product (GNP), but to a much greater degree. Business aircraft purchases are especially vulnerable to corporate economizing (see pp. 9 and 15).

1/ Shift-share analysis is an economic evaluation of the change in U.S. producers' market share in the domestic market (see pp. 14-17).

- Although U.S. commuter and business aircraft manufacturers are generally competitive in technology and material costs, they have suffered a moderate decline in market share.

U.S. producers, importers, and purchasers responding to the Commission's questionnaire indicate that, in most respects, domestic producers have remained broadly competitive with foreign producers, including technology and material costs. However, other data show a moderate decline in U.S. producers' market share, especially in export markets. Respondents indicate that U.S. manufacturers face a number of competitive disadvantages attributable to the fact that foreign governments own and/or support a large number of competitors. This relationship often gives an edge to foreign producers in sales financing (availability and terms), protection of home markets, and in some cases, access to government subsidies. Such assistance lowers the barriers to entry in the commuter and business aircraft industries, reduces fixed costs, and increases profitability. Higher profit levels may enable foreign firms to increase research and development efforts, invest in state-of-the-art technology, and thus increase their competitiveness (see p. 80).

- Product liability costs and competition from used aircraft are responsible for some of the decrease in sales.

The sharp increase in U.S. commuter and business aircraft product liability costs, which can constitute up to 30 percent of the purchase price of these aircraft, is another important factor in the decline in sales. Liability insurance adds upward pressure on aircraft prices, further discouraging U.S. sales. Another factor that reduced purchases of new aircraft was the burgeoning used aircraft market. In terms of units, the ratio of sales of used business aircraft to that of new business aircraft was only 1.3 to 1 in 1981-82 but increased to 4.6 to 1 in 1983-84 (see pp. 11 and 99).

- Trade competition has aggravated the fall in commuter and business aircraft sales.

U.S. imports of commuter aircraft accounted for an annual average of 57 percent of apparent U.S. consumption, and business aircraft imports constituted an annual average of 33 percent during the 5-year period. Exports, which in better years accounted for over 40 percent of U.S. production, dropped in 1984 to 3 percent of commuter aircraft production and 17 percent of business aircraft production. Producers in the United Kingdom, Canada, France, and Brazil were cited by questionnaire respondents as the most important competitors in both U.S. and third-country markets (see pp. 36 and 49).

- The production slump forced far-reaching responses by U.S. producers.

U.S. commuter and business aircraft manufacturers closed down 8 facilities and laid off more than 17,000 employees during 1980-84. Some corporate parents have also attempted to sell off ailing general aviation

divisions. As banks and shareholders have shared in the industries' distress, the cost of capital to the industry has risen. Capital improvements and expansions have been canceled, even as the producers made significant cost reductions and labor saving efforts. Despite sharply diminished sales, the industries invested an average of 6 percent of annual sales in plant investments (see pp. 6 and 22).

- o Many foreign commuter and business aircraft manufacturers receive production and financial assistance.

Government-owned commuter and business aircraft producers, especially those firms that have been targeted by their government for development, often receive both direct and indirect assistance. Direct assistance frequently takes the form of production loans or actual grants. Central government financing during the launch phase of new commuter and business aircraft is common. Capital infusions during this period are extremely important, as the inherent risks involved can determine the future success of a manufacturer. Financial assistance is also provided for the production of commuter and business aircraft. This allows foreign manufacturers to go forth with production without being forced to rely on acquiring capital from commercial sources at market rates (see p. 101).

- o Aircraft size, price, and quality were cited by commuter and business aircraft purchasers as the most important factors in aircraft acquisition.

In response to Commission questionnaires, commuter airlines overwhelmingly noted passenger capacity, followed by price, quality, and financing, as the most important purchasing criteria. These were followed closely by factors such as fuel efficiency, product reputation, and range of the aircraft. Business aircraft purchasers noted aircraft size and price as being primary considerations in new aircraft acquisition. Range, producer reputation, and fuel efficiency were the most important secondary considerations (see pp. 104-107).

- o Effects on the U.S. trade balance differ greatly.

Measured in terms of gross aircraft values, commuter and business aircraft trade contributed over $640 million to the deterioration of the U.S. trade balance between 1980 and 1984, changing from a $130 million surplus to a $510 million deficit. Data obtained by the Commission, however, indicate that anywhere from 12 to 80 percent of the value of imported aircraft represent U.S. components, with an unweighted average of roughly 48 percent. By contrast, the vast majority of domestic aircraft are wholly U.S. made. The net adverse U.S. balance of payments impact is, therefore, much less than the gross but may increase as progress in vertical integration by foreign producers erodes dependence on U.S. parts and components (see pp. 36 and 64).

- Prospects for the business and commuter aircraft segments today appear mixed.

No major economic recovery appears imminent either in the United States or in its main markets abroad. Industry sales forecasts for the next 5 to 15 years vary widely, averaging between 2 and 6 percent annual growth. Forecasts project that the largest growth will continue to be in large commuter aircraft, a market niche where U.S. producers may not compete. 1/ One bright spot is the recent decline in the dollar's strength relative to currencies of most foreign competitor and market nations, with the prospect for continued international intervention to keep the dollar at or below present levels. Another positive factor is the exceptionally high level of industry investment, both in absolute amount and as a percentage of sales. These investment levels compare favorably with those of foreign competitors. On the pessimistic side, the industry does not foresee any short-term relief from the depressing effects of escalating product liability costs, although legislation to limit liability has been proposed (see pp. 91 and 95).

- Near-term factors affecting U.S. producer prospects in world competition are mixed.

Overall, factors favorable to the competitiveness of the U.S. industry are the continued backing of large, diversified corporate parents, progress in cost cutting, production technology improvements, a relatively strong level of investment spending, and the recent decline of the dollar. Foreign competitors, however, are strongly favored by their government ownership and support, and their dominant position in large-capacity commuter aircraft. Domestic producers appear to fare well in quality and performance characteristics which were rated highly by prospective purchasers. However, indications that loss of market share to imports was a much less important factor than the decline in overall market demand should also be encouraging, since this suggests that the industry can expect recovery along with a general economic expansion (see p. 109).

- Pricing and cost containment considerations seem to be the most critical tests of future recovery.

The competitive aspect of particular importance to the business aircraft sector, where U.S. industry is best positioned to compete, and therefore potentially a key determinant of future sales, is price. In this respect, trends in interest rates and the effects of U.S. producers' efforts to hold prices against the pressure of liability and other cost increases may prove to be the most critical tests of the future competitiveness of the U.S. business aircraft industry. Another pivotal question is whether U.S. producers will choose to diversify product offerings in order to challenge foreign dominance at the large end of the commuter aircraft market. The very limited range of products currently offered by domestic producers in this market segment is

1/ The Boeing Corp.'s recent purchase of the Canadian commuter aircraft manufacturer, deHavailland, constitutes the only U.S. entry in the large commuter airplane market.

considered to be highly detrimental with respect to the future of this industry. The Boeing Corp.'s recent purchase of the Canadian commuter aircraft manufacturer, deHavilland, offers the only possibility for U.S. involvement in this market segment in the near term (see p. 112).

The U.S. Commuter and Business Aircraft Industry

Product description

Commuter and business aircraft constitute the largest portion of general aviation aircraft. 1/ Industry sources indicate that these two segments account for almost 75 percent of all general aviation flight hours. Although helicopters are used by both regional airlines and businesses, they are not included in this study. Commuter aircraft are defined, for the purpose of this study, as civil airplanes for scheduled airline, charter, or air taxi use, powered by piston, turboprop, turbojet, or turbofan engines and having a seating capacity ranging from 8 to 100 passengers. 2/ Currently, there are 30 basic commuter aircraft models in operation, produced by 17 manufacturers in 14 different countries. These planes range in price from $500,000 to $16 million. There are also seven models in various stages of development and certification, which will be delivered to commuter airlines during 1986-87. The commuter airplane models presently in service and the planes under development are listed in appendix C.

Business aircraft, as defined in this study, are civil airplanes for corporate, executive, business, and/or unscheduled air taxi use, powered by piston, turboprop, turbojet, or turbofan engines, and having a maximum ramp weight not to exceed 70,000 pounds. 3/ Although most small- and medium-size business aircraft are completed flight-ready at the production facility, many larger business planes are purchased from the manufacturer uncompleted or "green." 4/ A green airplane, equipped only with basic flight instruments and crew seats, is taken to a completion facility. Outfitting of the interior basically entails the installation of carpets, cabinetry, and passenger seats. Although there are standard interior configurations offered by these centers, industry sources state that most orders specify custom configurations. The aircraft is then painted according to the customer's

---

1/ General aviation is defined by the Federal Aviation Administration (FAA) as all civil aviation activity except that of certificated major and national air carriers. These aircraft include commuter, corporate, and recreational private-use aircraft. Military aircraft are not included in general aviation.

2/ Commuter aircraft, as defined by the FAA, include only airplanes with fewer than 60-passenger seating capacity and 18,000 pounds, or less, payload capacity.

3/ Although these two industries are considered separately in this analysis, it is important to note there can be some overlap in usage of particular aircraft.

4/ The term "green" does not relate to the aircraft's final color, but to the primer used before paint is applied. Green is currently used to describe any uncompleted aircraft.

specification, and avionics are installed. The cost of corporate aircraft completion can add from $800,000 to $1.6 million to the purchase price of certain planes. 1/ Several business aircraft manufacturers have attempted, however, to capture a portion of the custom market by upgrading their in-house completion facilities. There are 49 different business aircraft model types in use, as well as 8 planes under development, ranging in price from $112,000 to $15.0 million. These aircrafts are produced by 20 companies in 9 countries. A listing of these airplanes can be found in appendix C. Recently, however, 2 manufacturers of large-transport jet aircraft announced the launching of programs to offer planes for corporations needing high-volume transportation for their executives. The smallest of these new aircraft are almost three times as large and twice as costly as the largest business jet currently marketed. Therefore, the large-transport corporate planes do not generally compete with the business aircraft included in this study and are not within the scope of this study.

Many of the producers of commuter and business aircraft now in use or under development are actively marketing alternate uses of their airplanes. A number of commuter aircraft, 2/ although originally conceived for airline use, are finding application in the corporate market. Alternatively, at least one manufacturer of business jets has proposed the usage of their airplanes by scheduled airlines in an all "first-class" configuration. Still another market that both commuter and business aircraft producers are hoping to tap is that of the air ambulance. A large portion of the manufacturers are offering air ambulance versions of their aircraft, equipped with modern medical equipment.

Additionally, there are military or "special mission" versions of the aircraft included in this study. Because of the growing trend to utilize "off-the-shelf" airplanes, the Federal Government is purchasing (or leasing) an increasing number of general aviation aircraft. These planes are used for a variety of tasks, including search and reconnaissance, maritime patrol, training, and passenger and cargo transport. The following tabulation shows the military versions of U.S.-produced commuter and business aircraft. 3/

Manufacturer	Civil version	Military version
Beech	King Air 90	U-21A (various models).
Beech	Super King Air B-200	C-12 (various models).
Cessna	Citation SII	T-47A.
Gates	Learjet 35A	C-21A.
Gulfstream	GIII	SRA-1.
Gulfstream	ditto	SMA.

1/ "Finishing With A Flair," Business and Commercial Aviation, July 1985, p. 4.

2/ Because this study frequently shifts discussion between commuter and business aircraft and markets, underlining in this report is provided to help readers identify the shift between the two topics.

3/ Data gathered from discussions with company representatives.

Many manufacturers are marketing stretched versions of their airplanes, and others are considering stretched versions. There are numerous technical and commercial reasons for stretching a plane. With few exceptions, commuter and business aircraft are designed to operate at higher gross weights than specified. This capability allows producers to offer greater range or passenger capacity with small additions to the fuselage length. Stretching the aircraft's wings is another way to increase the economic performance of a basic airplane design, since it can lower the seat-mile cost of operation. 1/

Industry officials agree that the reason behind the proliferation of alternate versions of commuter and business aircraft is an attempt to extend the production runs and add more stability to an otherwise very cyclical market. However, the alternate versions are not expected to account for more than 15 percent of total industry sales.

Technology and materials

Development and incorporation of advanced technology is also an important factor in the competitiveness of an aircraft producer. Industry sources indicate that it was industry demand, which was influenced by economic factors, that stimulated manufacturers to make state-of-the-art technology improvements in commuter and business aircraft during 1980-85. Major advances have been made in structural design, aerodynamic efficiency, engines, propellers, control systems, instrumentation, and navigation systems. Also, recent regulatory constraints on noise levels in many residential areas have prompted manufacturers to incorporate quieter engines on many new, general aviation aircraft.

There has been a growth in the use of composites in aircraft design to reduce weight and improve fuel efficiency. Those materials most generally used include glassfibre reinforced plastics, carbon-fiber, fibrelam, graphite-epoxy, and kevlar-aramid fibers. There has also been some recent research done by aerospace firms on aluminum-lithium alloys. Almost all commuter and business aircraft currently in production use composites in some noncritical secondary structures, including rudders, ailerons, spoilers, trim tabs, fixed trailing-edge panels, and unpressurized cabin floors and beams. Composites on the completed airplane currently average about 7 to 15 percent by weight. Several manufacturers, however, were involved in certification and marketing of all-composite aircraft during 1980-85. These include established manufacturers such as Beech Aircraft Corp. and Gates Learjet Corp., as well as new entrants to the market such as Lear Fan, Avtek Corp., and the Old Man Airplane Co. (OMAC). 2/

1/ Bron Rek, "Turboprop Airlines Get Bigger," Interavia, July 1985.

2/ On May 24, 1985, the Lear Fan Corp. filed for protection under chapter 11 of the U.S. Bankruptcy Code. The future production of this aircraft, which was to be certified in 1986, is in question. The Avtek Corp., in December 1985, began the first low-speed wind tunnel testing on their Avtek 400 aircraft. Planned FAA certification is set for the last quarter of 1987. OMAC has frozen the final design on their Laser 300 aircraft, and is currently flight testing a prototype at their production facilities in Georgia. Certification is expected in mid-1987.

The use of composites is still considerably more expensive than the steel, aluminum, and titanium parts they are replacing. The process of molding and testing composite parts adds significantly to their cost. The production of composite parts is also labor intensive, and the manufacturing process does not always yield a guaranteed level of quality in series production. Even with these constraints, several manufacturers have made significant expenditures in composites, often assisted by infusion of capital from their parent corporations. Gulfstream Aerospace Corp. recently added a 70,000-square-foot building for the production of advanced composite parts and assemblies. Beech Corp. has also made numerous research and development and capital expenditures in this area. Industry sources indicate that, although the use of composites is most often associated with military aircraft, the greatest increase in composite use in nonmilitary applications is expected to be in business aircraft. 1/

However, many purchasers of business and commuter aircraft contacted during this study have expressed reservations about the overall economic feasibility of a large percentage of composite materials on an airplane. These concerns mainly center around repairability, lightning protection, weathering, and possible degradation by chemicals or fuel. A study done by a West German airline found that extensive damage to composite materials can cost twice as much to repair as similar damage to a metal structure. This is partially due to the fact that major damage to a composite structure generally requires replacement rather than repair, and composite part repair/replacement takes twice as long to perform. 2/

In conjunction with the use of composites, there has been increased use of adhesive bonding instead of industrial fasteners in commuter and business aircraft. Bonding however, also involves different and complex production procedures, including surface preparation, adhesive selection, curing, and nondestructive testing. This joining technique does allow significant weight savings that translate into increased fuel efficiency. Numerous manufacturers of both commuter and business aircraft are using bonding in their airplane production.

U.S. producers

In terms of available facilities, the United States has the largest commuter and business aircraft manufacturing base in the world. Currently, there are 6 U.S.-owned domestic producers of these aircraft: Beech Aircraft Corp.; Cessna Aircraft Co.; Fairchild Aircraft Corp.; Gates Learjet Corp.; Gulfstream American Corp.; and Piper Aircraft Corp. Mooney Aircraft Corp. is the only foreign-owned domestic producer. These companies are actively engaged in the design, assembly, marketing, and service of the actual completed aircraft. Also, the majority of these producers build other general

1/ Sam Jones, "Use of Graphite in Aircraft Growing Rapidly," American Metal Market, Mar. 4, 1985.

2/ "Carriers Seek Proof of Composite Maintenance, Repair, Testing Techniques," Aviation Week & Space Technology, Feb. 25, 1985, p. 117.

aviation aircraft, components for military aircraft, and missiles. All of these manufacturers are wholly owned subsidiaries of larger corporations. 1/ The following tabulation illustrates these relationships. 2/

Subsidiary	Parent
Beech Aircraft Corp----------	Raytheon Co.
Fairchild Aircraft Corp------	Fairchild Industries.
Gates Learjet Corp----------	Gates Corp.
Gulfstream American Corp-----	Chrysler Corp.
Mooney Aircraft Corp---------	Mooney Holding Co. 1/
Piper Aircraft Corp----------	Lear Siegler Corp.
Cessna Aircraft Co----------	General Dynamics Corp. 2/

1/ Mooney Holding Co. is 50 percent owned by Group M.S.C. S.A., Paris, France, and 20 percent owned by Euralair S.A., Paris France.

2/ On Jan. 8, 1986, General Dynamics announced that it was postponing the planned acquisition of Cessna Aircraft Co. General Dynamics currently owns over 95 percent of the outstanding shares of Cessna stock.

The opportunity for product diversification, cross-utilization of facilities, and technical synergism are three important reasons for recent acquisition of general aviation manufacturers by large, diversified corporations. 3/

Furthermore, a Japanese-owned firm (Mitsubishi Aircraft International) located in Texas assembled aircraft from both imported and domestically produced components during 1980-85. This company was a wholly owned subsidiary of Mitsubishi Heavy Industries, Ltd., Tokyo, Japan, but was purchased by Beech Aircraft Corp. in December 1985. There are also two U.S. companies currently engaged in developing civil aircraft for business use. These firms are Avtek Corp. (Camarillo, Ca) and OMAC (Albany, Ga). In addition to these present and potential future aircraft manufacturers, numerous establishments in other industries build components used to construct or repair these planes. The unique requirements of the civil aircraft industry necessitate close and continuing relationships with the manufacturers of major specialized systems used in commuter and/or business aircraft.

In spite of the relatively small number of domestic producers, the general aviation industry is highly competitive. The majority of the manufacturers produce similar aircraft with comparable performance measures and price. The industry is also highly concentrated, with the top three manufacturers supplying a large percentage of domestic production during 1980-84.

1/ On Jan. 8, 1986, General Dynamics announced that it was postponing its planned acquisition of Cessna Aircraft Co. because of the U.S. Government's suspension of contracts to General Dynamics.

2/ Data gathered from Commission staff discussions with company representatives.

3/ Speech by David S. Lewis, chairman, General Dynamics Corp., at the National Business Aircraft Association Convention, Sept. 24, 1985.

U.S. production

U.S. production of commuter and business aircraft declined from 9,615 planes in 1981 to 2,091 planes in 1984, or by 78.3 percent (table 1). These figures include production for U.S. purchases as well as exports. The vast majority of domestic production is devoted to business aircraft. An average of 87 percent of U.S. production over the last 5 years consisted of piston-powered, business airplanes. However, in response to the depressed market for these small planes, many domestic manufacturers have shifted production to larger turboprop and jet business aircraft.

Table 1.--Commuter and business aircraft: U.S. production, by types, 1980-84

(In units)

Type	1980	1981	1982	1983	1984
Commuter aircraft	1/	67	56	51	76
Business aircraft	11,758	9,548	4,794	2,749	2,015
Total	1/	9,615	4,850	2,800	2,091

1/ Data are business confidential.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

This significant decline in U.S. production of commuter and business aircraft during the period is mainly attributed to the 1981-83 recession. The market for piston-powered airplanes, generally owned and operated by individual businessmen, was severely affected by the recession. Production of commuter aircraft recovered somewhat in 1984, but business aircraft production remained depressed.

These figures show that the commuter and business aircraft industry is very cyclical. In the past, the domestic producers have adjusted employment and production accordingly, but in recent years, the prolonged, depressed worldwide market for their planes has forced manufacturers to take new steps. Newly installed managers have responded to the changed market by closing production facilities and/or consolidating manufacturing operations within the past year. Table 2 shows these changes in the industry during 1980-85.

Table 2.--Commuter and business aircraft: U.S. manufacturers' closings and consolidations of production facilities, 1980-85

Producer	Facility	Action/date
Piper	Renoro, Pa	Closed facility, production transferred to Vero Beach, Fl, 1983.
Piper	Lock haven, Pa	Facility closed, corporate headquarters and assembly operations moved to Vero Beach, Fl, 1984.
Piper	Quehanna, Pa	Closed facility, production transferred to Vero Beach Fl, 1984.
Piper	Santa Maria, Ca	Closed facility, production transferred to Vero Beach, Fl, 1985.
Beech	Liberal, Ks	Closed facility, consolidated operations at other plants, 1985.
Cessna	Strotherfield, Winfield, Ks.	Closed facility and sold site, 1985.
Cessna	Pawnee Division and Wallace Division, Wichita, Ks.	Consolidated into 1 division, 1985.
Gates Learjet	Wichita, Ks	Moved some subassembly operations, final assembly, and production flight testing of model 20 and model 30 to Tucson, Az, 1985.
Gulfstream	Bethany, Ok	Closed facility, now available for sale, 1985.
Piper	Lakeland, Fl	Closed facility and consolidated operations at Vero Beach, Fl, 1985.

Source: Data gathered from discussions with company representatives.

Additionally, because of the severe contraction in the market for recreational aircraft (which in the past has been an important product area for many of these producers), many of the manufacturers have suspended or discountinued certain models. In February 1986, Piper announced that production of most of the firm's piston-powered aircraft had been temporarily suspended because of the decline in the market. 1/ Alternatively, many producers have placed more emphasis on the production of larger, more sophisticated aircraft. These planes, generally the higher priced, twin-engine models, often have higher profit margins than other aircraft.

U.S. shipments

U.S. shipments of commuter and business aircraft decreased annually during 1981-84, in total from 7,152 to 1,631 units (table 3). 2/ In value terms,

1/ Eileen White, "Lear Siegler Inc. Stops Producing Some Piper Planes," Wall Street Journal, Feb. 4, 1986.

2/ Shipment data do not include spare parts. Industry sources note that in an individual aircraft sale, parts constitute less than 1 percent of the plane's purchase price.

shipments declined from $2.1 billion in 1981 to $1.3 billion in 1983 before rising by 31 percent, to $1.7 billion, in 1984. Although piston-powered business aircraft dominated U.S. shipments in quantity, turboprop and jet business planes constituted 67 percent of the value of shipments in 1981 and 78 percent in 1984.

Table 3.--Commuter and business aircraft: U.S. shipments, by types, 1980-84

Item	1980	1981	1982	1983	1984
	Quantity (units)				
Commuter aircraft	1/	45	44	58	72
Business aircraft:					
Piston engine	7,016	6,260	3,048	1,811	1,425
Turboprop and jet engine	1,629	847	510	344	134
Subtotal	8,645	7,107	3,558	2,155	1,559
Total	1/	7,152	3,602	2,213	1,631
	Value (1,000 dollars)				
Commuter aircraft	1/	67,825	58,518	89,901	147,373
Business aircraft:					
Piston engine	671,282	637,271	329,121	216,047	213,258
Turboprop and jet engine	949,090	1,443,614	1,246,746	969,421	1,301,849
Subtotal	1,620,372	2,080,885	1,575,867	1,185,468	1,515,107
Total	1/	2,148,710	1,634,385	1,275,369	1,662,480

1/ Data are business confidential.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. manufacturers of commuter aircraft indicated that in 1982, the average delivery lead time quoted for aircraft shipments varied from 13 to 18 weeks. By 1984, the average period had risen to 15 to 22 weeks. Regarding business aircraft, domestic producers noted that delivery lead time decreased during 1982-84. In 1982, the average lead time for small business planes ranged from 4 to 8 weeks, and the period for larger planes was 16 to 26 weeks. By 1984, the necessary waiting period for small business aircraft remained at approximately the same level, while the figure for larger planes had fallen to an average of 12 to 20 weeks. 1/ Specific figures are not available for the first half of 1985; industry sources, however, indicate that general aviation shipments, as a whole, decreased to their lowest level in over 40 years, with large declines appearing in those products covered by this study.

1/ Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

As stated earlier in this report, the U.S. military has begun to purchase (or lease) "off-the-shelf" commuter and business aircraft for a variety of uses. Preliminary data are available only for the most current periods. In 1984 a total of 95 aircraft (valued at over $135 million) were sold or leased to the United States military; in 1985 72 of these planes (valued at $162 million) were delivered, as shown in the following tabulation: 1/

Company	1984	1985
Beech	52	17
Cessna	0	7
Gates	40	40
Gulfstream	3	8
Total	95	72

The recession of 1981-83 depressed shipments and adversely affected both commuter airline and corporate yields, hindering their ability to purchase new aircraft. Industry sources indicate that shipments have historically been correlated with GNP growth. Figure 1 illustrates that for 1980-84, changes in the value of shipments correlated with the direction of changes in the rate of GNP growth but were more volatile. Financial analysts have noted that the price increases of new planes in recent years has led purchasers to keep their airplanes longer or to buy used equipment.

Increased foreign competition in the domestic market has also been cited as an important reason for the decline in U.S. shipments. Additionally, much of the reason for the low level of domestic shipments in January-June 1985 was the uncertainty regarding new U.S. tax legislation. Under the proposed tax schemes, the investment tax credit would be repealed, and the use of business aircraft by noncorporate personnel would be considered taxable-in-kind income. Because of these proposals, many purchasers adopted a "wait-and-see" attitude, delaying, or even foregoing, new aircraft acquisitions. Agreement on the corporate aircraft issue was reached in May 1985, when Congress agreed to support a sliding scale method for evaluating the taxable value of nonbusiness personnel trips. However, final rules have not yet been issued. Financial analysts assert that there must be a stable capital recovery system in place in order for commuter airlines to commit to long-term equipment acquisitions. 2/ The uncertainty regarding both the elimination of the investment tax credit (ITC) and the modification of the accelerated cost recovery system (ACRS) has caused many airlines to postpone new aircraft purchases.

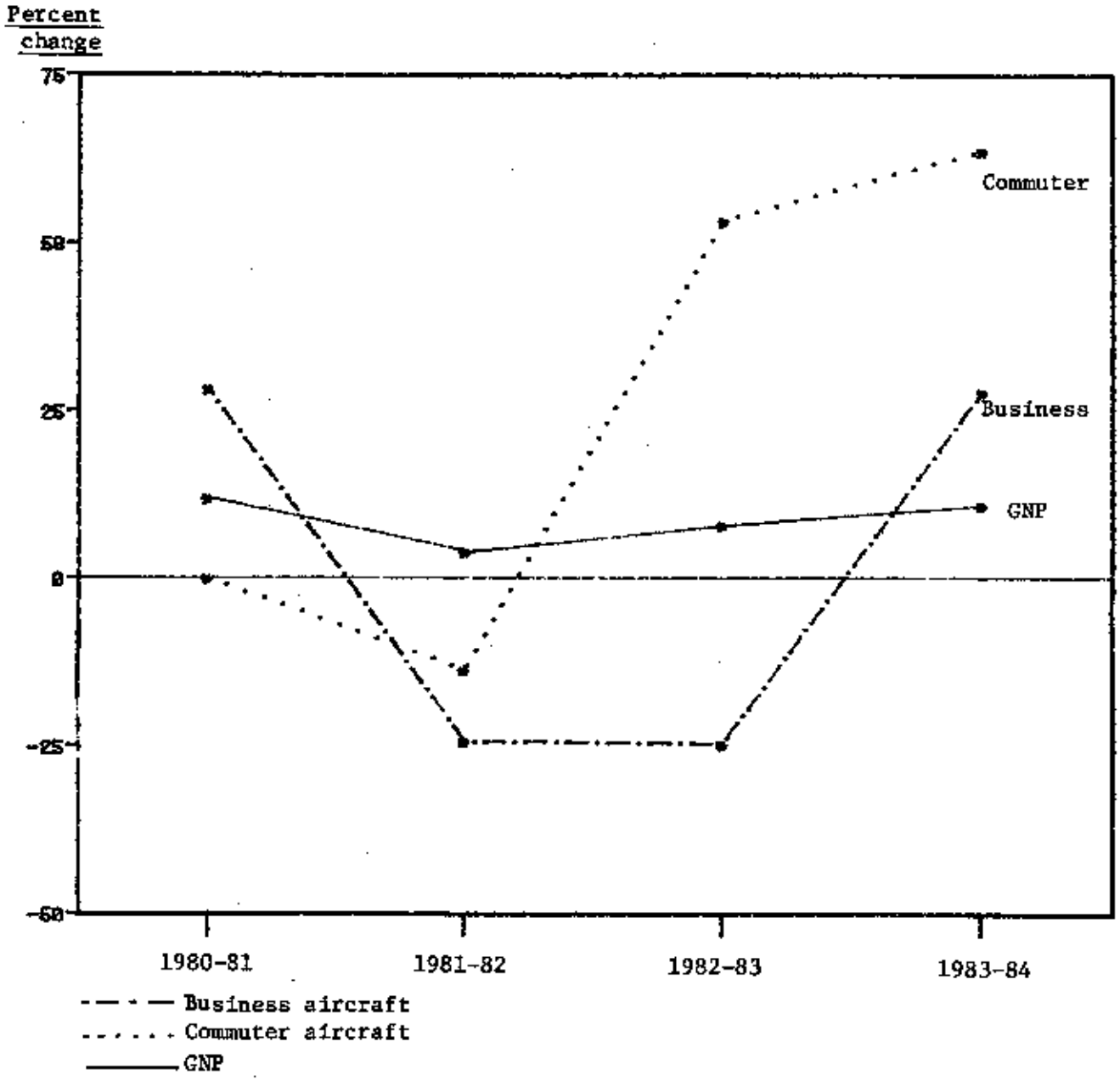
A further factor in the decline in domestic producers' sales has been the decision by U.S. producers not to enter the commuter market for airplanes above 19 seats. Fairchild Aircraft Corp., in conjunction with Saab-Scania of

---

1/ General Aviation Manufacturers Association, and "1985 Shipments Off For 7th Year; GAMA Sees Hope From Utility Users," General Aviation News, Jan. 20, 1986, p. 1.

2/ Speech of Braxton McKinnon, Delta Airlines, RAA Spring Trade Mart, Apr. 24, 1985.

Figure 1.--Trends of U.S. shipments of commuter and business aircraft and U.S. Gross National Product (GNP), 1980-84.



Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission and official U.S. Government statistics.

Sweden, was however, the only U.S. entrant in this market. 1/ U.S. producers list several reasons for their decision not to enter this market: (1) the size of the market was very uncertain; (2) the solvency of the potential purchasers was questionable; (3) sales of business aircraft were buoyant and quite profitable; 2/ and (4) a number of foreign government-owned manufacturers were in or entering this market. Also several manufacturers had committed significant resources to other product ventures in the aerospace industry. Additionally, the U.S. industry asserts that the U.S. Government was partly responsible for their decision. Domestic producers indicate that the Civil Aeronautics Board (CAB) conveyed a real sense of uncertainty regarding the size of aircraft that would actually be permitted in commuter operations. 3/

The sale of used or "preowned" aircraft have also been blamed for sluggish sales of new commuter and business aircraft in recent years. Despite a general decline in the demand for all aircraft during 1981-84, industry sources note that used airplane transactions outpaced new sales by a considerable margin. Currently, the useful life of an aircraft can approach 25 years, depending on the utilization of the plane. Approximately 96 percent of all of the business jets ever built are currently in active operations. 4/ Additionally, business airplane utilization is very low compared with that for commuter airlines. This is one of the general reasons for the proportionally larger number of used business planes, compared with commuter aircraft, offered for sale.

Although specific figures for both commuter and business aircraft are not available, data on preowned jet and turboprop business aircraft sold substantiate the increasing importance of the used airplane market. As shown in the following tabulation, used business plane sales totaled 2,488 during September 1, 1983-August 31, 1984, and exceeded new sales by a 4-to-1 margin. 5/ It is estimated that used corporate aircraft sales alone totaled $1.1 billion in 1984. 6/ Industry officials stress that over 80 percent of these aircraft were sold to U.S. operators.

1/ As of Nov. 1, 1985, Fairchild Aircraft Corp. became only a subcontractor to Saab Scania for the SF 340 program for the first 108 aircraft produced. At that point Saab Scania will take over all production responsibilities.

2/ Testimony of Langhorne Bond, President, Short Brothers (USA), Inc., before the U.S. International Trade Commission, Aug. 27, 1985.

3/ Richard Malkin, "America's Commuters Look Abroad," Commuter World, July-August 1985, pp. 34-35.

4/ Speech by T. Dewi Rolands, Executive Vice President, British Aerospace, Inc., before the Fourth Annual Used Transport Aircraft Marketing Symposium, Nov. 5, 1985.

5/ "Used Equipment Represents More Business Aircraft Sales," Aviation Daily, Oct. 4, 1984, p. 183.

6/ David North, "New Concerns Hinder Efforts to Reverse Decline In Sales," Aviation Week and Space Technology, Sept. 23, 1985, p. 49.

Period	Number of new business planes sold	Number of used business planes sold	Ratio of used to new business aircraft sold
Sept. 1, 1981-Aug. 31, 1982---	837	1,091	1.3 to 1
Sept. 1, 1982-Aug. 31, 1983---	470	1,423	3.0 to 1
Sept. 1, 1983-Aug. 31, 1984---	543	2,488	4.5 to 1

Industry sources indicate that one of the factors that triggered the switch to used aircraft was the recession in 1981-83. A number of commuter carriers reduced their fleets, choosing to eliminate routes that were no longer profitable. A large number of business planes were offered for sale because companies decided to reduce, or even eliminate, their in-house flight departments. Additionally, new commuter and business aircraft that had been ordered in the early 1980's began to be delivered, allowing the companies to sell their older equipment. As a result of these factors, a very large number of preowned aircraft were offered for sale. Also, the market underwent a significant change in the way used airplanes were perceived. With detailed, recorded maintenance programs in place for both types of airplanes, the buyers could accurately assess the condition and value of these aircraft.

In 1983, over 500 preowned planes were available on the open market compared with a historical level of about 200 planes. Oversupply forced price reductions of these planes. Industry sources state that it was still possible to buy a preowned aircraft at less than one-half of the price of a similar new plane in 1984. Available statistics indicate that the average 1981 airplane has a used retail value of only 45.9 percent of that of a similar, new 1985 replacement plane, the average 1982 plane sells for 52.2 percent, and the 1983 average was 61.6 percent of its 1985 counterpart. 1/ Prices for preowned commuter and business aircraft have stabilized recently and are expected to remain within 10 to 15 percent of their present levels for 3 years. 2/ Purchasers of business aircraft indicated in questionnaire responses that there is often very little difference in performance between new airplanes and many that are less than 5 years old. Tables 4 and 5 provide a comparison for several models of commuter and business aircraft.

1/ "Aviation Intelligence," Business & Commercial Aviation, October 1985, p. 38.

2/ "Used Commuter Aircraft Prices More Stable," Journal of Commerce, Nov. 15, 1984, p. 2, and "Terrorist Actions Boost Sales of Corporate Jets," Aviation Week & Space Technology, July 8, 1985, p. 28.

Table 4.--Commuter aircraft: Comparison of price and cruising speed, by specified models, 1981 and 1984

Model	1981 price	1984 price	Change in price	1981 cruising speed	1984 cruising speed	Change in speed
	1,000 dollars		Percent	Knots per hour		Percent
Cessna 402	334	509	52	174	174	-
Twin otter	1,170	1,800	54	180	182	1
C99	1,335	1,842	38	252	248	-2
Jetstream	2,200	2,850	30	245	240	-2
Metro III	1,845	2,500	36	240	264	10
Bandeirante	1,496	1,943	30	220	220	-
Shorts 330	2,870	3,355	17	189	189	-
Dash 7	5,020	8,000	59	234	228	-3
F-27	6,350	6,500	2	256	259	1

Source: Regional Airline Association, 1981 Annual Report, and 1985 Annual Report.

Table 5.--Business aircraft: Comparison of price and performance features, by specified models, 1980 and 1985

Model	1980 price	1985 price	Change in price	Change in range	Change in speed
	1,000 dollars		Percent	Nautical miles	Knots per hour
Lear 35A	2,855	3,850	35	190	9
Citation I	1,696	2,192	29	100	6
Citation II	2,387	2,960	24	-245	-1
Westwind I	2,765	3,700	34	57	-
Westwind II	3,147	4,349	38	119	-
Falcon 10	2,950	4,350	47	197	15
Falcon 50	8,400	10,950	30	114	-

Source: "Used Jets to Dominate Market Till 1990?," Interavia, August 1985, p. 26.

As a result of these increased aircraft prices, a number of U.S. firms have announced programs to rebuild and/or modify older aircraft. Modifications typically include overhauling or replacing engines and avionics, refurbishing the interiors, and offering new warranty guarantees. Cessna Aircraft Co. recently announced its plans to rebuild its Citation I and Citation II business jets. The Sabreliner Corp. of St. Louis, Mo, has recently begun delivery of "extended life" versions of the original Sabreliner 60 business jet; this firm also remanufactures two other Sabreliner models. 1/ The Super 580 Corp. is also involved in preowned aircraft modifications. Their plane, the Super 580 (a remanufactured version of Convair models

1/ "Aviation Intelligence," Business & Commercial Aviation, October 1985, p. 28.

340/440/550) is being offered to commuter airlines at about $35,000 to $70,000 less per seat than the new, pressurized, turboprop commuters. In addition, the Allison Gas Turbine Division is marketing a stretched version of this aircraft to seat 72 to 76 passengers. 1/ These programs are not limited to U.S.-built products. A BAC-111 modification program is being considered by the Dee Howard Co. in Texas to convert these airliners into corporate jets. 2/ Industry sources indicate that the proliferation of remanufactured used aircraft for both commuter and business use is an attempt to stimulate the market by increasing the attractiveness and desirability of older planes.

Because of the importance of used aircraft of both commuter and corporate types, many manufacturers have been forced to accept preowned planes in trade in order to sell new aircraft. Several U.S. firms have established used aircraft divisions in their marketing departments to sell these airplanes. Many used commuter airliners are now being sold to existing rather than new carriers. Regional airline officials note that there is now a much smaller number of new startup carriers than in the past. Many existing airlines have difficulty obtaining financing for newer, more expensive models.

The increased sophistication of purchasers of both business and commuter aircraft has led to a greater scrutiny of the life-cycle cost of aircraft ownership. One very important component is the capital cost of acquiring the aircraft. Operators are often willing initially to sacrifice fuel efficiency in order to save money. The recent stability in fuel prices has further enhanced the marketability of older airplanes.

One of the important advantages noted in the purchase of new equipment has been the benefit of the investment tax credit. However, sources in the used aircraft industry are quick to point out that a company must be profitable to utilize the ITC. Analysts also indicate that since many firms had tax losses from recession years to carry forward, the importance of the ITC has diminished.

Used aircraft have been an important force in the market in recent years. Their desirability and availability has given purchasers an alternative to acquiring new equipment. Industry analysts expect the commuter and business aircraft market to be greatly affected by preowned airplanes for several years.

U.S. producers have recently expressed concern over sales losses to foreign competitors in civil aircraft markets, particularly turboprop and jet-powered business aircraft. However, it is important to note that total sales worldwide in these markets have also declined during this period. An analysis of the shift in the share of the U.S. market captured by domestic producers (referred to as shift-share analysis 3/) is shown below. It is

---

1/ Arnold Lewis, "Off the Block," Business & Commercial Aviation-Commuter, October 1985, p. C-16.

2/ "Aviation Intelligence," Business & Commercial Aviation, October 1985, p. 26.

3/ Shift-share analysis first measures what total sales would have been at the end of a period if domestic producers had maintained the same share of the market as they had at the beginning of the period. The difference between what sales would have been and actual sales is attributed to a loss in market shares. The rest of the decline is attributed to a decline in demand.

important to note, however, that data are limited to unit sales, which do not take into account changes in product mix or analyze changes in value. Therefore, the analysis gives only a rough indication of the extent to which the decline in U.S. sales over the period may be due to a loss in market share and how much could be attributable to the overall decline in demand. Since unit values increased during the study period, this measure probably overstates the importance of the decline in demand.

World shipments.--World shipments of jet-powered business aircraft peaked in 1981 at 555 airplanes and then declined by roughly 50 percent by 1984 to 268 airplanes (table 6). The U.S. share of world shipments averaged 65 to 70 percent during 1980-81, fell to less than 50 percent in 1983, but recovered to 64 percent in 1984. Shift-share analysis indicates that the major portion of the decline in U.S. unit sales of business jets is attributable to a decline in world demand; much less can be attributed to a loss in market share, as shown in the following tabulation (in percent):

Decline in sales attributable to:	
Loss in market shares	7.3
Decline in demand	92.6

Table 6.--Business aircraft world shipments and the U.S. share of the world market for turboprop and jet-powered business aircraft, 1980-84 1/

Item	1980	1981	1982	1983	1984
Jet-powered airplanes:					
U.S. shipments---------(units)--:	326	389	259	139	172
Total shipments---------(units)--:	497	555	444	285	268
U.S. share of total shipments----------(percent)--:	65.6	70.1	58.3	48.8	64.2
Turboprop airplanes:					
U.S. shipments---------(units)--:	744	844	403	275	204
Total shipments---------(units)--:	808	901	414	285	208
U.S. share of total shipments----------(percent)--:	92.1	93.7	97.3	96.5	98.1

1/ This table does not analyze piston-powered business aircraft.

Source: General Aviation Manufacturers Association.

World shipments of turboprop business aircraft also peaked in 1981 and declined steadily from 1982 to 1984. However, the U.S. share of total shipments increased from 92 percent in 1980 to 98 percent in 1984. These data suggest that U.S. producers were able to gain a larger share (in quantity) of a declining market.

U.S. shipments.--U.S. shipments of all types of business aircraft declined steadily from 5,305 airplanes in 1980 to 1,244 airplanes in 1984 (table 7). The U.S. market share fell from 96 to 93 percent during the same period. Shift-share analysis indicates that the major portion of this decline

is attributable to a decline in demand, as indicated in the following tabulation:

Reason	Share (Percent)
Loss in market shares	1
Decline in demand	99

Table 7.--Business aircraft shipments into the U.S. market and the U.S. share of the this market, 1980-84

Item	1980	1981	1982	1983	1984
All business aircraft:					
U.S. shipments---------(units)--	5,305	4,530	2,328	1,559	1,244
Total shipments---------(units)--	5,518	4,773	2,503	1,650	1,337
U.S. share of total shipments----------(percent)--	96.1	94.9	93.0	94.5	93.0
Turboprop and jet-powered airplanes:					
U.S. shipments---------(units)--	1,337	209	295	259	74
Total shipments---------(units)--	1,548	447	460	339	151
U.S. share of total shipments----------(percent)--	86.4	46.8	64.1	76.4	49.0

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Note.--Data for a separate analysis of piston-powered business aircraft are not available.

U.S. sales of turboprop and jet-powered business aircraft declined by 94 percent, from 1,337 airplanes in 1980 to 74 aircraft in 1984. The U.S. market share declined irregularly from 86 percent in 1980 to 49 percent in 1984. The loss in sales during this period could be attributed to a decline in demand, as indicated below: 1/

Reason	Share (Percent)
Loss in market shares	4.4
Decline in demand	95.6

In conclusion, although the industry has experienced significant declines in sales in both types of aircraft, shift-share analysis suggests that these

1/ Because the U.S. market share varied considerably during this period, shift-share analysis is more difficult to use, as the analysis depends heavily on the base year chosen. For example, if 1981 is chosen as the base year, then the U.S. market share actually increased from 1981 to 1984.

declines could be attributed largely to the decline in overall demand for business aircraft.

U.S. capacity and capacity utilization

The commuter and business aircraft industries' capacity to produce aircraft fell from 13,795 units in 1981 to 11,760 units in 1984 (table 8). Industry capacity is generally based on the operation of 2 shifts, 5 days per week, 51 weeks per year. The decline in capacity reflects large-scale plant closings and consolidations, as well as many product line deletions, that have occurred since 1980. Overall industry utilization of plant capacity totaled 82.6 percent in 1980 and 69.7 percent in 1981. The utilization rate then declined significantly to 39.0 percent in 1982. Further reductions to 23.4 percent and 17.8 percent were realized in 1983 and 1984, respectively.

Table 8.--Commuter and business aircraft: U.S. producers' capacity, production, and capacity utilization, by types, 1980-84

Item	1980	1981	1982	1983	1984
Commuter aircraft:					
Capacity---units	1/	75	100	135	155
Production---do	1/	67	56	51	76
Capacity utilization percent	93.3	89.3	56.0	37.8	49.0
Business aircraft:					
Capacity---units	14,290	13,720	12,325	11,840	11,605
Production---do	11,758	9,548	4,794	2,749	2,015
Capacity utilization percent	82.3	75.1	38.9	23.2	17.0
Total:					
Capacity---units	1/	13,795	12,425	11,975	11,760
Production---do	1/	9,615	4,850	2,800	2,091
Capacity utilization percent	82.6	69.7	39.0	23.4	17.8

1/ Data are business confidential.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

In contrast to the overall industry trend, commuter-aircraft-manufacturing capability rose during the 5-year period, totaling 155 units in 1984. However, the rate of utilization of these facilities declined from 93.3 percent in 1980 to 49.0 percent in 1984. As shown in table 8, however, the vast majority of the industries' resources are devoted to business aircraft. U.S. capacity to manufacture business planes decreased from 13,720 units in 1981 to 11,605 units in 1984. Capacity utilization recorded similar declines, falling annually from 82.3 to 17.0 percent during 1980-84. In response to the Commission questionnaires, the U.S. industry attributed the declines in both

commuter and business aircraft capacity utilization to insufficient demand caused, in part, by a weakened economy and import competition.

Capacity utilization can also be expressed as the percentage of the actual number of production workers divided by the number of workers necessary to achieve practical capacity. The number of workers required to achieve maximum practical capacity to produce commuter and business aircraft totaled 36,568 persons in 1981 (table 9). This figure than increased irregularly from 28,498 in 1982 to 29,513 workers in 1984. Capacity utilization, as indicated by the ratio of actual production workers to the preferred level of production workers to obtain maximum practical capacity, decreased annually from 85.4 percent in 1980 to 48.7 percent in 1983. This rate rose slightly to 49.4 percent in 1984. Capacity utilization in 1984 for commuter aircraft manufacturers totaled only 53.7 percent, and in the business aircraft industry, the comparable figure was 49.2 percent.

Table 9.--Commuter and business aircraft: U.S. producers' capacity, employment, and capacity utilization, 1980-84

Item	1980	1981	1982	1983	1984
Commuter aircraft:					
Capacity (workers 1/)					
number--	2/	1,046	1,360	1,642	1,752
Production workers					
do----	2/	930	918	665	941
Capacity utilization					
percent--	69.8	88.9	67.5	40.5	53.7
Business aircraft:					
Capacity (workers 1/)					
number--	30,108	35,522	27,138	26,386	27,761
Production workers					
do----	25,838	28,591	17,400	12,990	13,650
Capacity utilization					
percent--	85.8	80.5	64.1	49.2	49.2
Total:					
Capacity (workers 1/)					
number--	2/	36,568	28,498	28,028	29,513
Production workers					
do----	2/	29,521	18,318	13,655	14,591
Capacity utilization					
percent--	85.4	80.7	64.3	48.7	49.4

1/ Measured in employment terms.
2/ Data are business confidential.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

The following tabulation illustrates the two measures of capacity utilization:

Year	Production capacity utilization	Employment capacity utilization
1980	82.6	85.4
1981	69.7	80.7
1982	39.0	64.3
1983	23.4	48.7
1984	17.8	49.4

The employment measure shows the labor-intensive nature of commuter and business aircraft manufacturing and the lag in reducing employment even with significant production declines. The trends of the two indicators are comparable with the exception of 1984, when capacity utilization in employment increased while production utilization decreased.

Respondents to the Commission's questionnaire indicated that it would take approximately 7 to 12 months to expand to full practical capacity, assuming there was sufficient demand. However, to reach this level of manufacturing, U.S. producers indicated that it would be necessary again to build up a timely acquisition schedule for raw materials and subcomponents, as well as to recruit the required labor force. This latter factor is critical to the success of the industry in periods of increased demand, as production of commuter and business aircraft is relatively labor intensive. Training new employees is both expensive and time consuming. Industry sources note that once a production line ceases, it is difficult and costly to restart.

Employment and wages

Employment in the commuter and business aircraft industries tends to be cyclical. Large fluctuations in employment are quite common as producers respond to slack demand by substantially reducing employment. During 1980-84, the number of persons employed in U.S. commuter and business aircraft establishments rose from 37,843 workers in 1980 to 41,123 workers in 1981 (table 10). Overall employment then declined irregularly to 23,883 persons in 1984. An average of 79 percent of those employed in these establishments were production workers. Production workers engaged in the manufacture of commuter aircraft totaled 941 in 1984 compared with 930 in 1981. The number of business aircraft production workers followed a decreasing trend during the 5-year period, from 27,727 employees in 1980 to 15,435 employees in 1984. 1/ Decreased aircraft demand, resulting in plant consolidations and relocations, and discontinuation of several product lines were cited as the reason for reduced industry employment. Another factor noted in questionnaire responses was the increased success of foreign-built airplanes in the U.S. market. Shipments of off-the-shelf general aviation aircraft (mostly business airplanes) to the military have helped stabilize employment in the last 2 years.

1/ According to their submission to the Commission of Aug. 9, 1985, Mitsubishi Aircraft Industries, located in San Angelo, Tx, employed 310 persons in 1984. This does not include the temporary or contract workers employed during peak workload periods.

Table 10.--Average number of employees and production and related workers in establishments producing commuter and business aircraft, 1980-84

Item	1980	1981	1982	1983	1984
Average number of all persons employed in the reporting establishments	37,843	41,123	27,939	22,473	23,883
Production and related workers engaged in the production of:					
All products	29,461	33,519	21,925	16,837	19,702
Commuter aircraft	1/	930	920	969	941
Business aircraft	27,727	32,734	19,898	15,037	15,435

1/ Data are business confidential.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

The commuter and business aircraft industries employ all levels of unskilled and skilled labor. Many of the occupations, such as engineers, electricians, machinists, painters, and mechanics, are common to any industry that is engaged in the construction of large, metallic structures. Other jobs, however, are very specific to general aviation aircraft, and often these skills are not applicable to other industries. Some of these trades include aircraft line assemblers, hydropress operators, honeycomb cutting machine workers and preflight inspectors. 1/

Although the cost of labor in the United States has not traditionally been cited as a commercial hindrance to domestic manufacturers, a few producers have recently relocated their operations to nonunionized areas. The two major organized labor groups in the commuter and business aircraft industries are the International Association of Machinists and Aerospace Workers (IAM) and the United Automobile, Aerospace and Agricultural Implement Workers of America (UAW). Officials of the IAM indicate that union membership in aerospace firms in Wichita, Ks (the location of three major producers), declined from 18,600 persons in 1981 to 9,116 persons in 1984. Membership was estimated to total only 4,396 persons in June 1985. Although comparable data are not currently available for UAW membership, industry analysts assert that this organization has also suffered significant membership declines.

Industry officials note that numerous other jobs in varying segments of the U.S. economy are generated from commercial and business aircraft production, totaling four times the actual general aviation industry employment level. The General Aviation Manufacturers' Association indicates that employment in sales and service support for commuter and business aircraft flight operations, flight training and maintenance, as well as subcomponent manufacturers, is dependent upon employment in this sector of the economy. 2/

1/ Data provided by John Elliott, Beech Aircraft Co., June 1985.
2/ Aerospace Industries Association, The U.S. Private, Business and Light Transport Aircraft Industry, October 1984, p. 17.

A draft study conducted by the office of Senator Howard Baker in 1984 stated that those workers displaced in the commuter and business aircraft industries are often unlikely to find comparable jobs, as alternate employment generally offers lower wages than the aerospace industry. Nonaerospace companies may be reluctant to hire displaced workers with recall rights, because they could return to the aircraft-manufacturing industry at any time.

Hours worked.--The standard aircraft work week consists of 5 8-hour days (in shifts), for an average of 51 weeks per year. Overtime is also common, depending on the schedule requirements of different work areas of the production line. Data from the Commission's questionnaire indicate that man-hours worked by production and related workers in the manufacturing of all products decreased irregularly during 1980-84, as shown in the following tabulation (in thousands of hours). 1/

Year	Man-hours, all products	Man-hours, commuter aircraft	Man-hours, business aircraft
1980	61,663	1,250	59,122
1981	64,312	2,023	62,289
1982	46,860	1,922	44,083
1983	34,212	1,406	31,972
1984	37,724	1,939	32,159

The number of man-hours worked by employees in the commuter aircraft industry fluctuated during the 5-year period, increasing overall from 1.3 million hours in 1980 to 1.9 million in 1984. In the business aircraft industry, the number of hours worked declined, totaling 32.2 million hours in 1984, compared with 59.1 million hours in 1980.

Wages.--In the majority of U.S. commuter and business-aircraft-manufacturing establishments, wages are paid on an hourly basis. Because of the significant union component in the industry, most of these rates of pay are also subject to the bargaining process. Figures supplied by the General Aviation Manufacturers Association indicate that in 1984, the average annual salary for an employee in the production of business aircraft was $26,618. 2/ A comparable figure for commuter aircraft is not available.

Wage rates in these industries are higher than those paid to production workers on average in all manufacturing industries and are comparable but generally less, for example, than those paid in the construction industry. Table 11 illustrates these hourly wages and those paid in commuter and business aircraft firms. Data from respondents to the Commission's questionnaires indicate that these aircraft industry workers received $9.10 per hour in compensation in 1980 compared with $11.82 per hour in 1984. Also, these employees normally receive higher wages for working second or third shifts. Wage rates in the U.S. commuter and business aircraft industries differ somewhat, according to geographic region.

1/ Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

2/ "Corporate Aviation," Fortune, Sept. 16, 1985.

Table 11.--Hourly wages paid to production and related workers in all manufacturing, construction, and commuter and business aircraft industries, 1980-84

Year	All manufacturing industries	Construction industry	Commuter and business aircraft industries
1980	$7.27	$9.94	$9.10
1981	7.99	10.82	10.09
1982	8.49	11.63	11.16
1983	8.84	11.95	11.23
1984	9.35	12.15	11.82

Source: Compiled from official statistics of the U.S. Department of Labor, Bureau of Labor Statistics, and data submitted in response to questionnaires of the U.S. International Trade Commission.

Total wages paid to all production and related workers in U.S. aircraft manufacturing facilities are shown in the following tabulation (in thousands of dollars). 1/

Year	Commuter aircraft	Business aircraft	All products
1980	12,519	537,763	610,925
1981	14,659	628,596	708,084
1982	16,040	491,946	553,916
1983	17,568	359,154	494,131
1984	42,161	380,240	596,249

Wages paid to workers for construction of all products manufactured in aircraft facilities decreased from a high of $708.1 million in 1981 to $596.2 million in 1984. For those employees engaged in commuter aircraft production, total wages paid increased by 237 percent during the 5-year period, from $12.5 million to $42.2 million. Compensation paid to business aircraft production employees totaled $380.2 million in 1984 compared with $537.8 million in 1980. 2/

Capital expenditures

During the 5-year period under consideration in this study, the U.S. commuter and business aircraft industries spent over $500 million for capital

1/ Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

2/ According to their submission to the investigation record of Aug. 9, 1985, Mitsubishi Aircraft Industries, San Angelo, Texas, paid $10,791,683.72 in U.S. wages in 1984.

Table 12.--Commuter and business aircraft: U.S. producers' capital expenditures for domestic facilities, by major types, 1980-84

Item	1980	1981	1982	1983	1984
Commuter aircraft:					
Land or land improvements	11	45	-	261	-
Building or leasehold improvements	2,494	850	2,117	3,867	613
Machinery, equipment, and fixtures:					
New	3,126	8,309	4,584	1,928	4,354
Used	-	-	-	-	-
All other	-	6,690	7,921	13,420	68,036
Total, commuter	5,631	15,894	14,622	19,476	73,003
Business aircraft:					
Land or land improvements	-	1,772	929	88	110
Building or leasehold improvements	23,336	26,341	10,948	11,375	15,988
Machinery, equipment, and fixtures:					
New	20,491	16,364	19,526	8,530	10,093
Used	510	15,372	18,593	19,737	55,370
All other	15,552	5,289	12,445	8,343	56,980
Total, business	59,889	65,138	62,441	48,073	138,541
Grand total	65,520	81,032	77,063	67,549	211,544

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

improvements. As shown in table 12, capital expenditures for domestic facilities manufacturing commuter aircraft remained close to $15 million per year during 1980-82 but then increased to $19.5 million in 1983 and $73.0 million in 1984. Prior to 1983, one of the largest portions of this industry's capital expenditure was devoted to the installation of new equipment to increase overall manufacturing capability. In 1983 and 1984, however, several manufacturers purchased important subcomponent suppliers to increase their vertical integration and overall efficiency as shown by the large expenditure in the "all other" category.

Capital expenditures in the business aircraft industry decreased irregularly during 1980-83 to $48.1 million. In 1984, however, U.S. producers spent $138.5 million for capital improvements. A large portion of this expenditure was devoted to used production equipment. Used equipment was purchased in order to conserve working capital, according to questionnaire respondents. U.S. manufacturers indicated that they made no capital expenditures for foreign facilities during 1980-84.

Industry sources indicate that prior to 1983, little investment was made in advanced technology equipment; rather, the main objective during that period was to increase manufacturing capability and upgrade existing facilities. However, in recent years, manufacturers have restructured their

operations to utilize more modern and efficient production methods and reduce the amount of time and labor required to build an aircraft. Important advances have been made using numerically controlled machine tools and computer-aided design and manufacturing (CAD/CAM) equipment. Some of this equipment has been purchased used. Significant expenditures have also been made in areas involving fabrication and molding of composite parts. Beech Aircraft Corp., for example, installed one of the largest autoclaves in the world in mid-1985 to cure composite parts.

In general, there is very little use of robotics in the manufacture of commuter and business aircraft. This is due to the fact that robotics are most efficiently utilized in areas with large production runs. However, industry officials confirm that the use of robots is being explored in riveting and painting operations, as well as for required tasks in hazardous work areas.

Industry analysts consistently emphasize that technology will play a critical role in the success of the commuter and business aircraft industries in future years. Capital expenditures, as a percentage of total U.S. shipments of commuter and business aircraft increased annually during 1981-84, as shown in the following tabulation:

Year	Expenditures/shipments (in percent)
1980	1/
1981	3.8
1982	4.7
1983	5.3
1984	12.7

1/ Data are business confidential.

The capital investments reported by manufacturers were undertaken during one of the most depressed periods in the history of these industries. U.S. manufacturers indicated their commitment to the installation of sophisticated machinery for fabrication, testing, and assembly of commuter and business aircraft, as well as factory automation and integrated information processing to retain and improve their market share. 1/

Research and development

The civil aviation industry is one of the United States' most technology-intensive industries. Research and development expenditures for the overall aerospace section represent approximately 15.4 percent of sales compared with 3.3 percent for all U.S. manufacturing industries. 2/ The domestic commuter aircraft industry spent 3.7 percent of its sales in 1984 for research and development compared with 10.9 percent in the business aircraft sector. In

1/ National Academy of Engineering, The Competitive Status of the U.S. Civil Aviation Manufacturing Industry, 1985, p. 22.

2/ Ibid., p. 19.

public statements, officials of Cessna Aircraft Co. indicated that the firm had been spending 8 to 12 percent of its sales revenues on research and developments. Gates Learjet Corp.'s research budget currently provides only 1 percent, but this company indicates that it will spend 5 percent of its sales during 1985-87 for research. Piper Aircraft Corp. indicates that it is spending approximately 3 percent of it sales volume for new research and development. 1/ Overall, these industries spent $170 million for new research in 1984, representing an increase of 51 percent over the comparable amount in 1980. Respondents to the Commission's questionnaire reported research and development expenditures during 1980-84, as shown in the following tabulation (in thousands of dollars). 2/

Year	Commuter aircraft	Business aircraft	Total
1980	9,159	103,763	112,922
1981	17,435	111,426	128,861
1982	15,687	115,646	131,333
1983	11,795	236,423	248,218
1984	5,490	164,523	170,013

Commuter aircraft research and development rose from $9.2 million in 1980 to its' highest level at $17.4 million in 1981 before declining annually to $5.5 million in 1984. However, research expenditures in the business aircraft industry increased each year, except 1984, reaching $164.5 million.

U.S. general aviation producers indicated a strong desire to retain large research and development expenditures, despite the low and unstable demand for their products. This may be due, in part, to the fact that most manufacturers are owned by large conglomerates that are able to absorb some of the financial risks associated with these investments. Research is currently being conducted in the areas of aerodynamics, structures and materials, propulsion, and electronics. Work is being done on improved airfoils and wing and body configurations in order to improve the aerodynamic efficiency and operational safety of business and commuter aircraft. As discussed earlier, significant research is under way to take full advantage of advanced composite materials. 3/ In the propulsion area, domestic producers are working in close cooperation with engine manufacturers to reduce interior and exterior noise and necessary powerplant maintenance. All of the industries' research and development have the overall objective of reducing the cost of both ownership and operation of aircraft. 4/

Although the U.S. commuter and business aircraft industries did not receive any U.S. Government loans or grants for research and development

---

1/ David M. North, "Business Aircraft Makers Stress New Technology to Cut Product Costs," Aviation Week & Space Technology, Sept. 30, 1985, p. 1677.

2/ Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

3/ It is important to note, however, that many purchasers of business and commuter aircraft have expressed reservations about the feasibility of composite parts.

4/ National Academy of Engineering, "Research and Technology Needs in General Aviation," NASA's Role in Aeronautics, 1981, pp. 9-11

during 1980-84, they did benefit from several Federal Government research programs. These projects are discussed in the "U.S. Government Involvement" section of this report. Questionnaire respondents noted benefits from cryogenics work done for the space shuttle, wing design and research, and propane testing done by the National Aeronautics and Space Administration (NASA).

Financial experience of the U.S. industry

Net sales for overall operations, as reported by respondents to the Commission's questionnaire, rose from $2.9 billion in 1980 to $3.5 billion in 1981 (table 13). Sales then declined irregularly to $2.7 billion in 1984. In 1981, over 85 percent of the industry's net sales were derived from commuter and business aircraft. By 1984, this figure had fallen to 80 percent. Producers are involved in the manufacture of smaller, general aviation aircraft, remotely piloted vehicles, missiles, and military aircraft. Although separate statistics are not available, questionnaire respondents indicated that, with the exception of recreational-type airplanes, the ancillary areas were generally more profitable than business or commuter aircraft production during the 5-year period. The profit ratio for overall operations for commuter and business aircraft producers decreased from 7.4

Table 13.--Commuter and business aircraft: U.S. producers' net sales and net operating profit on their overall establishment operations and on commuter and business aircraft operations, 1980-84

Item	1980	1981	1982	1983	1984
Overall operations:					
Net sales----------million dollars--	2,927	3,549	2,872	2,366	2,658
Net operating profit or (loss)----------million dollars--	217	281	95	(58)	(78)
Ratio of net operating profit or (loss) to net sales-----percent--	7.4	7.9	3.3	(2.5)	(2.9)
Commuter aircraft operations:					
Net sales----------million dollars--	1/	106	93	105	162
Net operating profit or (loss)----------million dollars--	1/	(14)	(9)	(13)	14
Ratio of net operating profit or (loss) to net sales-----percent--	(1.2)	(13.2)	(9.7)	(12.4)	8.6
Business aircraft operations:					
Net sales----------million dollars--	2,477	2,942	2,338	1,773	1,957
Net operating profit or (loss)----------million dollars--	189	331	142	(21)	(63)
Ratio of net operating profit or (loss) to net sales-----percent--	7.6	11.3	6.1	(1.2)	(3.2)

1/ Data are business confidential.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

percent in 1980 to 3.3 percent in 1982. In 1983 and 1984, the industries realized losses of 2.5 and 2.9 percent, respectively.

U.S. producers of commuter airplanes realized profits only in 1984. Prior to that year, the industry incurred losses ranging from $9 million to $14 million. The opposite situation occurred in the business aircraft industry. Manufacturers had net sales of $2.5 billion in 1980, compared with $2.0 billion in 1984. This translated into a profitability ratio of 7.6 percent in 1980 versus a loss totaling 3.2 percent in 1984.

U.S. Market

Description of U.S. market

Industry sources indicate that the United States accounts for an estimated 70 percent of the combined world market for commuter and business aircraft. The reasons for this lies in the structure of our air transportation system, the trend toward decentralization of business activity, and the large, geographic expanse of the United States. 1/ Sales in the U.S. market are also essential for any producer, foreign or domestic, because sales in the United States often establish necessary manufacturer and product credibility.

Commuter aircraft.--Commuter and/or regional airlines are the predominant users of commuter aircraft. These airlines are currently defined as those carriers that provide regularly scheduled passenger and/or cargo service with aircraft seating less than 60 passengers and a cargo payload capacity of 18,000 pounds or less. These airlines operate under Civil Aeronautics Board (CAB) regulation Part 298, FAR 135, and occassionally, FAR 121. Generally, these airlines perform at least five round trips per week between two or more points and publish flight schedules which specify the times, days of the week, and airports between which such flights operate. Air taxis, which also use this type of aircraft, are similar to commuter airlines in that they provide the same type of air transportation; however, their operations are not on a scheduled basis but are "for hire" for specific trips. They generally operate under CAB regulation Part 298 and FAR 135, which apply to aircraft of 12,500 pounds or less, except under special exception. 2/

The principal function of the short-haul transportation system provided by these carriers has been to provide small and medium-size communities with access to the nation's primary air transportation system. The operators utilize a variety of aircraft, differing in size and capability, according to their route structure and passenger loads. These aircraft, which are operated on trip lengths averaging 100 to 300 miles, are generally flown at lower altitudes than the planes utilized by the national and major airlines.

The CAB originally restricted commuter airlines to airplanes smaller than 12,500 pounds gross takeoff weight for the express purpose of confining their operations to service that would not compete with larger airlines. As it

---

1/ U.S. Department of Transportation, Federal Aviation Administration, FAA Aviation Forecasts, Fiscal Years 1985-1996, February 1985, p. 97.

2/ Ibid.

became evident that these commuter carriers were not a threat to the major airlines, this limitation was changed in 1972 from an aircraft size limitation to a maximum payload limitation--either 30 seats or 7,500 pounds of cargo. Most commuter airlines, however, preferred to continue utilizing smaller planes for several reasons. First, at that time, there were no modern aircraft available in the larger range that were specifically tailored to the economic and operational requirements of the commuter market. Additionally, the Federal Aviation Administration requires the addition of a cabin attendant for 20 or more seats, which adds another cost element for these carriers. More importantly, however, few commuter airline markets had the ridership or were financially able to support larger equipment in 1973. 1/ Early growth in the commuter airline industry was due to the conversion from small turboprop planes to large jet aircraft by the nation's large certified air carriers. The cost of operating this equipment was often too great to justify service to many outlying areas.

The Airline Deregulation Act is considered one of the single most important events that changed the shape of the U.S. commuter airline industry. The act, passed in October 1978, formalized a number of significant changes in Federal policy and regulations aimed at making the air transportation system more efficient. The act made the smaller carriers eligible for Federal loan guarantees for aircraft purchases and also extended subsidy qualification to them under the Civil Aeronautics Board's Essential Air Service Program (EAS). The EAS, established under section 419 of the Deregulation Act, guarantees "essential air service" for 10 years to all eligible communities (those receiving certified service on the date of passage, or those whose authorized service had been suspended, a total of 555 communities). Under this provision, commuter carriers providing this service are provided a subsidy payment from the U.S. Government in addition to the passenger fares received. Another provision of this act permitted regional airlines to receive the CAB's section 401 Certificate of Public Convenience and Necessity, effectively enabling these carriers to operate any type of aircraft. Regional airlines served 97 percent of the EAS communities in the continental United States in 1984. 2/ However, Congress has recently considered terminating the program prior to 1988. Another key component of deregulation allows airlines the opportunity to enter new markets or exit from those which are no longer economical. As a result of this provision, the major airlines withdrew from unprofitable markets to concentrate on longer, higher density markets. Commuter airlines quickly moved into these abandoned routes.

The Airline Deregulation Act, however, did not totally deregulate the commuter airlines. In some aspects, these carriers operate in a more constrained regulatory environment than they did before 1978. For example, they must now comply with more stringent reporting requirements and operating regulations; pilots must hold the highest level of FAA license, and even the smallest aircraft must meet much stricter safety requirements.

1/ Impact of Advanced Air Transport Technology, Office of Technology Assessment, Congress of the United States, 1982, p. 21.

2/ 1985 Annual Report of the Regional Airline Industry, Regional Airline Association, May 1985, p. 20.

In the early years, the regional airline industry was highly disaggregated. The vast majority of the carriers were small companies that operated only 1 or 2 planes with fewer than 10 seats over a small number of routes. In recent times, however, the commuter airline industry has strengthened and consolidated, increasing their level of overall management sophistication. Of the commuter carriers currently operating in the United States, almost 30 percent have been in business for 10 years or more, and over 50 percent, for 7 years or more. 1/ The industry has also been strengthened through mergers of a few of the leading carriers. Airline industry sources indicate that it is often more cost effective to expand through mergers and acquisitions than to purchase new aircraft. Many operators have also expanded their operations by going public. Regional Airline Association statistics show that almost 40 percent of the 50 leading regional air carriers are now publicly owned.

Bankruptcies have been a factor in the elimination of weaker airlines from the industry. The Regional Airline Association indicates that approximately 100 regional airlines have gone out of business since the deregulation process began in 1978. Three leading carriers terminated operations during 1984, and an additional 3 continued operations under Chapter 11. 2/

The number of commuter airlines operating in the United States fluctuated considerably during 1977-84 (table 14). There were only 163 carriers operating prior to deregulation in 1977. By 1978, the industry had grown to 252 airlines, or by almost 55 percent. The number of airlines reached its highest point at 277 in 1981 but declined during the next 2 years as a result of the U.S. recession. In 1984 there were a total of 221 commuter carriers operating in the United States. The number of aircraft operated by these airlines rose from 1,200 (with an average seating capacity of 11.9 persons) in 1978 to 1,915 (with an average seating capacity of 18.4 persons) in 1984. The U.S. regional airline fleet composition, in terms of aircraft size, is shown in figure 2. These aircraft were operated out of 853 airports in the United States in 1984, with 619 of these airports being served exclusively by commuter airlines. Industry sources indicate that the average stage length (distance of trip) for these carriers is 155 miles.

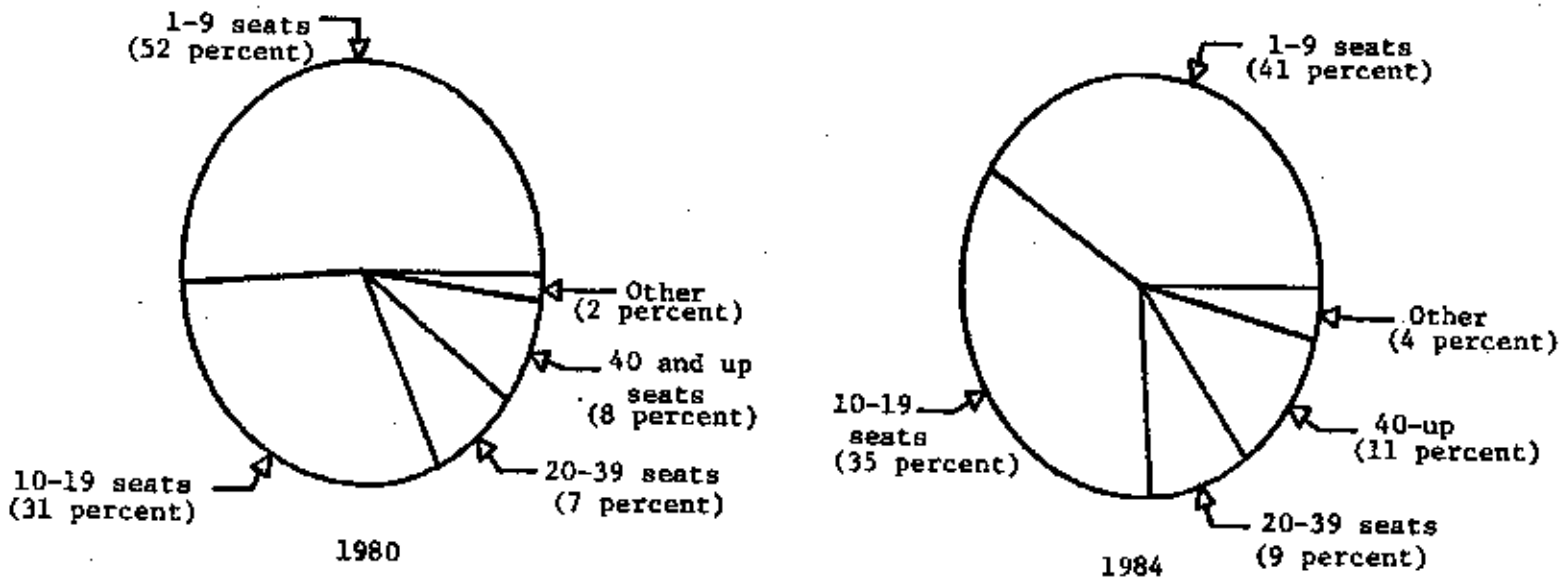
Regional airlines transported 26.1 million persons in 1984 compared with fewer than 10 million in 1977. Industry officials note that the leading 50 regional airlines carried 84 percent of total passengers enplaned in 1984. The top 100 carriers transported 96 percent of these passengers in that year. 3/ There are a number of reasons for the rapid growth of commuter air service since 1977. First, the speed and convenience of air travel are more attractive as incomes rise, and the rising number of businesses moving to small communities has also increased the demand for short-haul service. Second, the withdrawal of the larger airlines from smaller communities in 1978

1/ U.S. Department of Transportation, Federal Aviation Administration, FAA Aviation Forecasts, Fiscal Years 1985-1996, February 1985, p. 34.

2/ Regional Airline Association, 1985 Annual Report of the Regional Airline Industry, May 1985, p. 6.

3/ Ibid., p. 8.

Figure 2.--U.S. regional airline fleet composition, by aircraft sizes, 1980 and 1984.



Source: Regional Airline Association, Annual Report of the Regional Airline Industry, 1981 and 1985.

30

Table 14.--U.S. regional airlines: Number of airlines, aircraft in operation, and passengers transported, 1977-84

Item	1977	1978	1979	1980	1981	1982	1983	1984
Total carriers operating	163	252	258	237	277	245	218	221
Total aircraft in service	1/	1,200	1,450	1,606	1,743	1,857	1,808	1,915
Average seating capacity	1/	11.9	12.5	13.9	15.1	15.6	18.1	18.4
Passengers carried (in millions)	9.2	11.3	14.0	14.8	15.4	18.6	21.8	26.1

1/ Not available.

Source: 1985 Annual Report of the Regional Airline Industry, Regional Airline Association, May 1985, p. 6.

resulted in a faster growth rate for commuter airline ridership than normal growth in demand for air service would produce. Less capital is required to acquire or lease the type of aircraft suitable for commuter service. Therefore, entry into the commuter airline business has been relatively easy.

Additionally, integration with the primary air transportation system has been improving in recent years as the major airlines, the longer routes of which are customarily fed by commuter carriers, have begun to share ticket counters, gate space, and baggage-handling and reservation services. 1/ Many of these trunk carriers have, in fact, entered into interline relationships with regional airlines, often allowing the commuter carrier to use the trunk airline's two letter designator. 2/ As of December 1985, 45 regional airlines had become dedicated to major/national airlines. 3/ Examples of these include Eastern Airline's Eastern Metro Express, American Airline's American Eagle carriers, and Delta Airline's Delta Connections. These dual-designated commuter airlines carried almost 60 percent of total commuter airline passengers in 1984. It is generally to the advantage of the larger airlines to subsidize the regional airlines' costs through sharing of facilities, because the latter feed passengers that subsequently take trips with the major carriers. Industry analysts estimate that almost three-quarters of the passengers carried by regional airlines connect with another airline before concluding their air travel.

Business aircraft.--Business aircraft are utilized by both small companies and large corporations in the United States. Although the terms

1/ Impact of Advanced Air Transport Technology, Office of Technology Assessment, Congress of the United States, 1982, p. 27.

2/ Two-letter designations (abbreviations) are used by the U.S. air transportation industry to identify major and national airlines.

3/ John W. Olcott, "Is Code-Sharing Fair?," B/C Commuter, Business and Commercial Aviation, January 1986, p. C3.

"business," "corporate," and "executive" aircraft are used interchangeably in this report, there are two basic market groupings used in the industry. The FAA defines a business aircraft as one which is used by individuals, not for compensation or hire, but for transportation in the business in which they are engaged. Frequently, the owner of the business is the actual pilot of the aircraft. Executive or corporate aircraft are defined as those used by a corporation, company, or organization to transport its employees or property, and not for compensation or hire. These planes are generally staffed by professional flight crews.

In the 1960's, business aviation was a small community, with only a limited number of large corporations operating flight departments. The aircraft utilized in these operations were often reconstructed military aircraft or piston-powered planes. 1/ In the 20 years since then, the use of business-type aircraft has increased greatly for a variety of reasons. One important factor in this growth is the inconvenience of scheduled service with many major airlines. This is due in part to deregulation, which, as discussed earlier in this section, allowed airlines to withdraw from unprofitable markets, where many firms may be located. Often, scheduled airline service does not provide the flexibility required by a company. Additionally, because of overcapacity at many airports, long delays are sometimes experienced when utilizing the nation's primary air transportation system. For business executives, the use of an aircraft for on-demand travel can maximize efficiency. The dispersal of commercial and industrial facilities has prompted the appearance of the corporate shuttle, which provides scheduled, non-common carrier service for company employees between widely geographically separated plants. 2/ Average corporate aircraft utilization has grown from an estimated 250 to 300 hours per year in 1978 to almost 800 hours per year in 1985.

The increase in hijackings and terrorist activities throughout the world has also become a factor in the desirability of business aircraft. The increased safety afforded to company personnel by the utilization of its own airplane has been cited by several industry analysts as an increasingly important factor in a company's decision to purchase (or lease) an airplane. To ensure further the safety of both the personnel using the plane and the aircraft itself, many corporations do not have the company's name or logo painted on their airplanes. 3/

Generally, smaller businesses operate single-engine piston or turboprop airplanes; large, corporate flight departments operate a variety of aircraft ranging from helicopters (for travel of 200 to 300 miles) to large jets capable of cross-country or overseas travel. Sources in the National Business Aircraft Association have noted than an increasing number of companies are pooling their flight departments and airplanes. This pooling generally involves several companies sharing aircraft, maintenance, and flight crews. Industry officials

---

1/ National Academy of Engineering, The Competitive Status of the U.S. Civil Aviation Industry, 1985, p. 28.

2/ Aerospace Industries Association of America, The U.S. Private, Business and Light Transport Aircraft Industry, October 1984, p. 11.

3/ "Corporate Aircraft Security," Business and Commercial Aviation, September 1985, p. 14.

indicate that a desire to decrease costs and increase aircraft utilization are the reasons for these arrangements. Although specific data on the number of these aircraft in the United States are not available, industry sources estimate that there are approximately 160,000 aircraft classified as "business" for purposes of Internal Revenue Service records. In 1984, the FAA found that 63,773 airplanes were registered to companies in the United States, with over three-quarters of these planes classified as "business" aircraft. Industry analysts estimate that approximately 34,000 firms operated 60,000 aircraft in 1984. Officials of the National Business Aircraft Association believe, however, that only about 20,000 of these planes are operated on a day-to-day basis for business purposes. Of these, almost 9,400 are turboprops and jets, with the remainder being small, piston airplanes.

For the nation's largest corporations, the business aircraft has become an intergal part of their operations. Of the "Fortune 500 Corporations" doing business in the United States, almost 70 percent of these firms owned and operated business aircraft. In 1984, these companies utilized 1,677 aircraft, or 3 percent of the FAA's estimate of total corporate aircraft in the United States. The aircraft operated by these firms included 250 piston aricraft, 530 turboprop airplanes, and 897 jet-powered business aircraft. 1/

Barriers to entry

Because of the nature of commuter and business aircraft manufacturing, the new entrant to either industry faces substantial barriers to entry. The commitment to build an aircraft for either of these markets involves a considerable investment of time and capital. According to industry sources, approximately $250 million to $500 million is required in nonrecurring costs alone to design, produce, certify, and market new models. The magnitude of this investment varies considerably, however, depending on factors such as the size of the airplanes, initial production and sales, extent of product improvements, individual program productivity, and the amount of risk assumed by subcontractors. The bulk of the expenditure must be made early in the program, well before any appraisal of the eventual success of the venture can be made.

Additionally, there is a lengthy time period between the actual selling of the aircraft and the point at which the manufacturers are able to recoup their costs. Approximately 3 to 5 years are often required in order for an established aircraft manufacturer to perform all the necessary steps to deliver a commuter or business airplane. The time period required for a new entrant would most likely be even longer. Industry officials state that, as a general rule, approximately 250 to 300 aircraft must be sold by a manufacturer in order to recover developmental costs. High interest rates, inflation, and other nonforseeable economic factors can often raise this breakeven point. The rationale for the long time period required to make a profit on a commuter or business aircraft lies in the way these products are priced, a principal commonly known as the "learning curve." The learning curve concept states that labor costs decline steadily with the number of units produced, because

1/ Fred George, "Business Aviation and the Fortune 500," Business and Commercial Aviation, December 1985, pp. 75-79.

worker efficiency increases with experience. 1/ Each aircraft producer goes through a learning curve analysis in order to estimate the approximate breakeven number of airplanes. Therefore, the price of the plane is based on the estimated cost of producing the aircraft several years later. Additionally, derivatives of the initial aircraft model, incorporating such elements as improvements in fuel efficiency or increases in power, are generally required to maintain continuous sales. However, each derivation requires additional expenditures.

According to industry surveys, only 5 to 8 percent of the value of each airplane sold contributes to the amortization of the firm's development expenditures. Manufacturers will typically attempt to minimize their investment risk by seeking as many launch orders as possible. However, purchasers willing to take the risk of being launch customers often pay favorable prices, a small downpayment, or in some cases, no cash. Therefore, these early orders do not always infuse capital immediately into the firm.

Another formidable barrier that a new industry entrant must overcome is the lack of established credibility in the market. In both the commuter and business aircraft markets, performance and reliability are of critical concern. The manufacturer must not only have the capability to design and produce the plane, but must realize market acceptance.

Nonetheless, if a country decides that it wishes to develop aircraft-manufacturing capabilities, business and/or commuter airplanes provide favorable opportunities to enter the industry. The investment to commence production in the general aviation area is considerably less than in the large transport industry. Licensing arrangements or joint ventures can further reduce the cost of entry to the industry and allow the new entrant to gain expertise.

Factors influencing market demand

Commuter aircraft.--According to data received from questionnaire respondents in the U.S. commuter airline industry, route expansion and increased passenger traffic were cited as the two primary sources of market demand. Other factors noted were the need to replace older, less fuel-efficient planes, and the desire for more comfortable aircraft. These results parallel those found in the Commission's 1982 survey of the industry 2/ and a study done by Forecast Associates in November 1981. In these surveys, operators cited expanded routes as the most significant factor in adding new aircraft, with increased frequency of flights and the need for larger airplanes as additional determinants. The forces leading to route expansion and higher passenger loads include the interlining of regional carriers with major

1/ Aerospace Industries Association of America, The Challenge of Foreign Competition to the Jet Transport Manufacturing Industry, December 1981, p. 31.

2/ U.S. International Trade Commission, Economic Impact of Foreign Export Credit Subsidies on the U.S. Commuter Aircraft Industry: Report to the Committee on Finance, U.S. Senate, on Investigation No. 332-143 . . ., USITC Publication 1328, December 1982.

airlines, growing metropolitan population, increasing passenger disposable income, and urban decentralization.

Commuter airlines singled out Government regulations as one of the major factors that inhibit commuter aircraft purchases. Airport access restrictions were consistently noted as an important concern of these carriers. The proposed changes in the U.S. tax system (elimination of the ITC and modification of the ACRS system) have caused considerable uncertainty in the industry. To a lesser degree, unattractive financing packages for new aircraft purchasers were cited as inhibitors to industry growth.

Business aircraft.--U.S. purchasers of business aircraft overwhelmingly indicated that the need to provide prompt, on-demand travel for their company executives was the main factor that prompted the acquisition of their airplanes. Also noted was the desire for more modern, fuel-efficient airplanes. Several companies mentioned the requirements of having quieter planes, necessitated by more stringent noise regulations in their area.

Business aircraft operators indicated that lack of company profits was one of the major hindrances to purchasing an aircraft. Often, a certain level of company profitability is necessary in order to obtain top management approval for new aircraft acquisitions, regardless of any market demand factors. Also, the current indebtness of a corporation appears to be an important factor in the purchase of aircraft. In a study done by Data Resources, Inc., it was found that the average corporation buying a business airplane in the late 1970's was spending only 16 percent of its discretionary capital on all debt service. The comparable figure for 1985 is over 30 percent, showing that money that would have been allocated to a business aircraft is often being used to service debt. 1/ As with commuter airlines, corporate aircraft operators also indicated that Government regulations, restricted airport access, and potential tax law changes were additional factors in the purchasing decision for business aircraft.

Marketing

Commuter and business aircraft are marketed in the United States basically in the same fashion, regardless of manufacturer. Initial attempts to generate interest in the product rely on articles and advertisements in trade journals. A detailed sales campaign, including visits to potential purchasers, also takes place. Marketing representatives of the aircraft manufacturers collect details of the purchaser's aircraft needs and present an analysis that shows how their airplane will fulfill the necessary requirements. Salesmen generally remain in continual contact with commuter airlines or the flight departments of medium- and large-size corporations. Additionally, some manufacturers of smaller business aircraft sell their planes through dealer/distributor networks and not directly from the factory. A detailed discussion of the marketing of commuter and business aircraft can be found in appendix D.

1/ Gates Learjet Corp., "O'Mara Unveils New Marketing Plan," Jetstream, September 1985, p. 4.

Financing

A purchaser's commitment to purchase a commuter or business aircraft begins at one of three levels: a letter of intent to purchase, an option to purchase, or a firm order. The first two are usually nonbinding for the purchaser, while a firm order generally entails the signing of a sales contract and the tender of a downpayment. When a firm commitment is being made, the issue of financing comes into play. The first decision regarding financing is whether to purchase or lease the aircraft. This evaluation entails a detailed financial analysis of the discounted present value of cash flows and the associated tax impacts. Other critical variables to be considered include the assumed life and residual value of the aircraft, the ability to utilize tax benefits, the ability to finance the purchase, and the interest rate involved. Data obtained from commuter airlines responding to Commission questionnaires indicate a strong preference for leasing their equipment, but business aircraft purchasers expressed an overwhelming desire to purchase their planes.

Financing was noted as extremely important to commuter airlines. During 1979-81, purchasers generally obtained financing from private sources such as commercial banks. In recent times, however, there has been a move toward financing through shareholder equity, public debt, leasing, and manufacturer-sponsored programs. Industry sources note that the emergence of manufacturer-sponsored financing is another response to the intense competition in this market. A detailed discussion of the purchasing process and financing of aircraft acquisitions is found in appendix D.

U.S. consumption

Commuter aircraft.--U.S. consumption of commuter aircraft increased from 102 airplanes, valued at $178.3 million, in 1981 to 157 airplanes, valued at $483.6 million, in 1984 (table 15). The growth came despite the U.S. recession and its dampening effect on most domestic industries. There has also been a shift in demand to larger, more expensive aircraft. Sources in the regional airline industry indicated that increased traffic in many areas abandoned by major airlines after deregulation and increased public acceptance of traveling on smaller airplanes were the reasons for increased use of such aircraft. In the last 2 years, the trend of commuter operators to interline with major airlines has prompted new equipment acquisitions. The ratio of imports to consumption for commuter airplanes decreased from 73.5 to 56.1 percent in quantity and from 78.4 to 70.0 percent in value during 1981-84.

Table 15.--Commuter aircraft: U.S. shipments, exports of domestic merchandise, imports for consumption, and apparent U.S. consumption, 1980-84

(Quantity in units; value in thousands of dollars)

Year	U.S. shipments	U.S. exports	U.S. imports 1/	Apparent U.S. consumption	Ratio (percent) of imports to consumption
	Quantity				
1980	2/	2/	81	2/	2/
1981	45	18	75	102	73.5
1982	44	13	40	71	56.3
1983	58	12	59	105	56.2
1984	72	3	88	157	56.1
	Value				
1980	2/	2/	152,941	2/	2/
1981	67,825	29,357	139,795	178,263	78.4
1982	58,518	23,231	91,551	126,838	72.2
1983	89,901	16,745	118,960	192,116	61.9
1984	147,373	4,913	338,170	483,630	70.0

1/ Estimated by the staff of the U.S. International Trade Commission on the basis of data received from questionnaire responses.

2/ Data are business confidential.

Source: Compiled from data received in response to questionnaires of the U.S. International Trade Commission.

Business aircraft.--U.S. consumption of business aircraft decreased significantly in quantity during the 5-year period from 5,518 to 1,337 planes (table 16). In contrast, the value of apparent domestic consumption increased from $1.4 billion in 1980 to $1.7 billion in 1984. The vast majority of the U.S.-produced portion of domestic consumption during the period was smaller, owner-operated business airplanes. This is evident from a comparison of unit values. During 1980-84, the average unit value of all imported business aircraft was $3.3 million compared with an average of $347,000 for all domestically built business planes. The overall level of import penetration increased from 3.9 to 7.0 percent in quantity during 1980-84. In value terms, however, the ratio of imports to consumption decreased from 29.2 to 25.4 percent.

Table 16.--Business aircraft: U.S. shipments, exports of domestic merchandise, imports for consumption, and apparent U.S. consumption, 1980-84

(Quantity in units; value in thousands of dollars)

Year	U.S. shipments	U.S. exports	U.S. imports 1/	Apparent U.S. consumption	Ratio (percent) of imports to consumption
	Quantity				
1980	8,645	3,340	213	5,518	3.9
1981	7,107	2,577	243	4,773	5.1
1982	3,558	1,230	175	2,503	7.0
1983	2,155	596	91	1,650	5.5
1984	1,559	315	93	1,337	7.0
	Value				
1980	1,620,372	651,568	398,802	1,367,606	29.2
1981	2,082,885	725,454	746,891	2,104,322	35.5
1982	1,575,867	601,263	712,311	1,686,915	42.2
1983	1,185,468	304,717	378,203	1,258,954	30.0
1984	1,515,107	253,387	429,240	1,690,960	25.4

1/ Estimated by the staff of the U.S. International Trade Commission on the basis of data received from questionnaire responses.

Source: Compiled from data received in response to questionnaires of the U.S. International Trade Commission.

Turboprop and jet-powered business aircraft consumption followed a similar trend, totaling 151 units, valued at $1.5 billion in 1984, compared with 1,548 units, valued at $917.4 million, in 1980 (table 17). This table illustrates the fact that although turboprop and jet-powered business aircraft are small in quantity, they dominate the value of consumption. The average unit value of U.S.-built business turboprop and jet airplanes was $583,000 in 1980, $2.8 million in 1983, and $9.7 million in 1984. The comparable figures for imports were $1.9 million in 1980, $4.7 million in 1983, and $5.5 million in 1984. Consumption has been dominated by the larger, higher value business planes in recent years, as the market for smaller aircraft, most often purchased by individuals, drastically declined. U.S. shipments of business aircraft were especially dominated by large business jets in 1984, as shown by the unit value of these planes. As a percentage of U.S. consumption of the turboprop and jet-powered segment of the business aircraft market, imports captured 51.0 percent by quantity and 28.3 percent by value in 1984. U.S. consumption of business aircraft was adversely affected by the recession in 1981-83. Consumption, in terms of value, recovered somewhat in 1984 in response to growth in corporate profitability.

Table 17.--Turboprop and jet-powered business aircraft: U.S. shipments, exports of domestic merchandise, imports for consumption, and apparent U.S. consumption, 1980-84

(Quantity in units; value in thousands of dollars)

Year	U.S. shipments	U.S. exports	U.S. imports 1/	Apparent U.S. consumption	Ratio (percent) of imports to consumption
	Quantity				
1980	1,629	292	211	1,548	13.6
1981	847	338	238	747	31.9
1982	510	215	165	460	35.9
1983	344	85	80	339	23.6
1984	134	60	77	151	51.0
	Value				
1980	949,090	429,820	398,127	917,397	43.4
1981	1,443,614	549,376	746,111	1,640,349	45.5
1982	1,246,746	501,769	710,936	1,455,916	48.8
1983	969,421	251,336	376,613	1,094,698	34.4
1984	1,301,849	222,964	425,840	1,504,725	28.3

1/ Estimated by the staff of the U.S. International Trade Commission on the basis of data received from questionnaire responses.

Source: Compiled from data received in response to questionnaires of the U.S. International Trade Commission.

U.S. Imports

Tariffs and international agreements affecting imports

Commuter and business aircraft imported into the United States are classified and reported under several tariff and statistical provisions, depending primarily on the empty weight of the airplane. The classifications, according to the Tariff Schedules of the United States Annotated (TSUSA) (1985) (TSUSA), are as follows:

TSUSA item No.	Description
	Civil airplanes, new:
694.4143----------	Single engine.
	Multiple engines:
694.4146----------	Less than 4,400 pounds empty weight.
694.4148----------	4,400 pounds and over, but less than 10,000 pounds empty weight.
	10,000 to 33,000 pounds, inclusive, empty weight:
694.4150----------	Turbojet/turbofan.
649.4160----------	Other, including turboshaft powered.
694.4165----------	Over 33,000 pounds empty weight.

During the Tokyo round of the Multilateral Trade Negotiations, held during 1973-79 under the General Agreement on Tariffs and Trade (GATT), it was recognized by member countries that increasing government interference in the aircraft sector could lead to global pressures for restrictive trade policies for civil aircraft. Delegations from the United States and other major aircraft-producing countries sought to negotiate an agreement to deal with the full scope of nonmilitary aircraft trade policy issues. The Agreement on Trade in Civil Aircraft, popularly known as the Civil Aircraft Agreement, resulted from these negotiations. 1/

The agreement, which covers both commuter and business aircraft, became effective on January 1, 1980. 2/ Original signatories were Austria, Belgium, Canada, Denmark, the Federal Republic of Germany, France, Ireland, Italy, Japan, Luxembourg, the Netherlands, Norway, Sweden, Switzerland, the United Kingdom, and the United States. In addition to the signing by the nine member countries, the agreement was also signed by the European Community. Since the Civil Aircraft Agreement became effective in 1980, three additional countries have become signatories: Greece, Romania, and Eygpt. 3/ Spain also became a signatory to the agreement with its entry into the European Community in January 1986. A copy of the agreement is included in appendix E.

The Agreement on Trade in Civil Aircraft provides a basis for free and fair trade in the civil aircraft sector, addressing both nontariff and tariff issues. There are three main features to the agreement addressing government involvement in aircraft procurement; subsidies; and the elimination of all customs duties and nontariff barriers. The provision regarding government involvement in aircraft procurement forbids signatory countries from requiring or unreasonably pressuring airlines, manufacturing companies, or other firms,

---

1/ U.S. Department of Commerce, International Trade Administration, Agreement on Trade in Civil Aircraft, June 1980.

2/ The provisions of the Agreement on Trade in Civil Aircraft were implemented in U.S. statute by the Trade Act of 1979.

3/ Currently, the only countries that produce or have produced commuter or business aircraft that are not signatories to the Civil Aircraft Agreement are Brazil, Israel, Indonesia, and Australia.

to procure civil aircraft from a particular source. Additionally, signatories may not require offset production or support contracts in conjunction with the awarding of civil aircraft procurement contracts. The provision also guards against the providing or denying of benefits designed to influence procurement from a particular source.

The Agreement notes that the provisions of another agreement negotiated during the Tokyo Round, the Agreement on Technical Barriers to Trade, apply to trade in civil aircraft. The Technical Barriers agreement is designed to ensure that product standards, certification methods and other technical regulations and standards are not applied in a discriminatory fashion nor constitute an unnecessary barrier to international trade. Further, the Civil Aircraft agreement explicitly notes that the Technical Barriers agreement covers "civil aircraft certification requirements and specifications on operating and maintenance procedures," at least between signatories of the Civil Aircraft agreement. 1/

In the area of subsidies, the Civil Aircraft agreement notes that the provisions of another Toyko Round agreement, the Agreement on Interpretation and Application of Articles VI, XVI and XXIII of the General Agreement on Tariffs and Trade (Agreement on Subsidies and Countervailing Duties), also known as the Subsidies Code, apply to trade in civil aircraft. 2/ The Civil Aircraft agreement also states that the pricing of civil aircraft should be based on reasonable expectation of recoupment of all costs, including nonrecurring program costs. 3/

The Agreement further provides for the elimination of all customs duties and similar charges levied on, or in conjunction with, the importation of civil aircraft and engines, flight simulators for civil aircraft, and most parts and equipment of such aircraft. 4/ Offset production, which is the practice of requiring the importer to subcontract production to a domestic producer in exchange for an aircraft order, is also prohibited. The Agreement also indicates that signatories are not to apply import or export quotas or licensing requirements to restrict imports or exports of civil aircraft in a manner inconsisent with GATT. 5/

The Civil Aircraft Agreement also established a Committee on Trade in Civil Aircraft, composed of a representative from each signatory nation. The committee consults on matters relating to the agreement and works to ensure the continuance of free trade. Additionally, an important function of the Committee is to attempt to resolve any complaints from signatories alleging that other signatory nations are not fullfilling their obligations under the agreement. 6/

Another international agreement that has an impact on trade in civil aircraft is an offshoot of the OECD Arrangement on Guidelines for Officially

---

1/ Article 3. The Agreement on Technical Barriers to Trade can be found in GATT, Basic Instruments and Selected Documents (BISD), 26th Supp. at 8 (1980).
2/ Article 6. The Subsidies Code can be found in BISD, 26th Supp. at 56.
3/ Article 6.
4/ Article 2.
5/ Article 5.
6/ Ibid.

Supported Export Credits, agreed to in April 1973 and subsequently updated several times. As noted above, export credits play an important role in the sale of commuter and business aircraft. The OECD Arrangement does not apply to trade in civil aircraft because the participants in that Arrangment 1/ could not agree on specific terms that would apply to trade in civil aircraft; however, the participants in that arrangement did agree in 1975 that their export credit practices should "stand still" as of that date, and not thereafter be modified, pending the negotiation of a more comprehensive arrangement for civil aircraft export credits. This arrangement, known as the "Standstill" arrangement, does not provide guidelines for interest rates used in export credits, but does indicate the downpayment and maximum loan repayment terms that countries can offer in financing export sales. These terms are a 10-percent cash downpayment, a 7-year repayment period for executive jets and large turboprop aircraft, and 5 years for small aircraft. Repayment of loans is to begin within 6 months after the delivery date of the plane. This agreement applies to lease purchase arrangements as well as sales contracts. 2/

One very important deficiency of the Standstill Agreement is that it does not set any minimum interest rates, instructing only that governments "provide financing no softer than current practice." 3/ U.S. Government officials, however, have recently been engaged in negotiations to establish a comprehensive financing agreement addressing interest rates as well as repayment terms. In January 1986 tentative agreement was reached on a sector understanding for general aviation aircraft financing. This agreement complements the Arrangement on Guidelines for Officially Supported Export Credits, setting out the guidelines for official government export financing of the sale or lease of new aircraft. The terms and conditions of this agreement are shown in the following tabulation. 4/ The agreement, which will be implemented March 10, 1986, also prohibits tied aid credit for aircraft sales or leases.

Aircraft type	Credit terms
Turbine-powered aircraft, 30 to 70 seats	10 year term 1/ at matrix or commercial interest reference rate.
Other turbine-powered aircraft	7 year term at matrix or commercial interest reference rate.
Other aircraft	5 year term at matrix or commercial interest reference rate.

1/ Credit terms exceeding 8 years require prior notification to national export banks.

1/ Australia, Austria, Canada, EEC, Finland, Japan, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, and the United States. OECD Arrangement, Annex D.

2/ Information obtained from Office of Aerospace, U.S. Department of Commerce; and the U.S. Department of the Treasury.

3/ Ibid.

4/ Data provided by Bob Cassidy, U.S. Department of the Treasury, Feb. 7, 1986.

It should be noted that the Subsidies Code, though proscribing the granting of export subsidies on other than certain primary products, provides an exception from this prohibition for export credits that are in conformity with the provisions of an "international undertaking on official export credits to which at least twelve signatories to this Agreement [Subsidies Code] are signatories as of 1 January 1979." The OECD Arrangement is generally viewed as coming within the scope of this exception, and thus export credits granted in conformity with the Arrangement 1/ would likely not be viewed as violating the obligations of the Subsidies Code. 2/ It is possible to construe this exception as applying to export credits granted in conformity with the Standstill arrangement on the sale of civil aircraft, although as the Standstill arrangement does not regulate export credit interest rates, the exception would apparently only apply to such matters as the downpayment and length of loan terms covered by the Standstill arrangement.

Enforcement of these international arrangements is generally left to government-to-government consultations or dispute settlement mechanisms specified in the relevant international agreements. The Civil Aircraft Agreement, the Subsidies Code, and the Technical Barriers Agreement all contain specific procedures for resolving disputes between signatories to the agreements. 3/ While these procedures can only be invoked by governments, a private party in the United States may request that the United States government enforce the rights afforded the United States under trade agreements, including those listed above, by filing a petition under sections 301-306 of the Trade Act of 1974 4/ with the Office of the United States Trade Representative. 5/

1/ Hufbauer and Erb, Subsidies in International Trade 68-74 (MIT Press 1984). Note that this exception to the proscription on export subsidies contained in the Subsidies Code apparently applies even to nonparticipants in the OECD Arrangment if they are signatories to the Subsidies Code and if they in practice apply the interest rates specified by the relevant international undertaking, such as the OECD Arrangement. Annex, Illustrative List of Export Subsidies (k).

2/ Proscribed subsidies under the Subsidies Code include the export subsidies listed in Annex A, and domestic subsidies that cause injury to the domestic industry of another signatory, cause a nullification or impairment of benefits under the GATT accruing directly or indirectly to another signatory, or cause serious prejudice to the interest of another signatory. See Article 8 of the Subsidies Code.

3/ See Review of the Effectiveness of Trade Dispute Settlement Under the GATT and Tokyo Round Agreements, Inv. No. 332-212, USITC Pub. 1793 (December 1985) for a description of the dispute settlement procedures under the GATT and the Tokyo Round Codes, including those listed above. Note, however, that these dispute settlement procedures are only between signatories of the various codes. In some cases, though, it may be possible to bring a similar complaint, alleging an inconsistency with GATT obligations, before the GATT Council if the parties are both members of the GATT.

4/ 19 U.S.C. §§ 2411-2416.

5/ See USITC Pub. 1793 for a description of the section 301 petition procedure as well as an analysis of the effectiveness of the dispute resolution procedures of international agreements.

Moreover, a complaint that sales of commuter or business aircraft have been subsidized may be investigated under U.S. law to determine if countervailing duties should be imposed on subsidized imports of civil aircraft into the United States. In general, countervailable subsidies include export subsidies, including those subsidies listed in Annex A to the Subsidies Code, 1/ and certain domestic subsidies if provided or required by

---

1/ ILLUSTRATIVE LIST OF EXPORT SUBSIDIES

(a) The provision by governments of direct subsidies to a firm or an industry contingent upon export performance.

(b) Currency retention schemes or any similar practices which involve a bonus on exports.

(c) Internal transport and freight charges on export shipments, provided or mandated by governments, on terms more favourable than for domestic shipments.

(d) The delivery by governments or their agencies of imported or domestic products or services for use in the production of exported goods, on terms or conditions more favorable than for delivery of like or directly competitive products or services for use in the production of goods for domestic consumption, if (in the case of products) such terms or conditions are more favorable than those commercially available on world markets to their exporters.

(e) The full or partial exemption, remission, or deferral specifically related to exports, of direct taxes or social welfare charges paid or payable by industrial or commercial enterprises.

(f) The allowance of special deductions directly related to exports or export performance, over and above those granted in respect of production for domestic consumption, in the calculation of the base on which direct taxes are charged.

(g) The exemption or remission in respect of the production and distribution of exported products, of indirect taxes in excess of those levied in respect of the production and distribution of like products when sold for domestic consumption.

(h) The exemption, remission or deferral of prior stage cumulative indirect taxes on goods or services used in the production of exported products in excess of the exemption, remission or deferral of like prior stage cumulative indirect taxes on goods or services used in the production of like products when sold for domestic consumption; provided, however, that prior stage cumulative indirect taxes may be exempted, remitted or deferred on exported products even when not exempted, remitted or deferred on like products when sold for domestic consumption, if the prior stage cumulative indirect taxes are levied on goods that are physically incorporated (making normal allowance for waste) in the exported product.

(i) The remission or drawback of import charges in excess of those levied on imported goods that are physically incorporated (making normal allowance for waste) in the exported product; provided, however, that in particular cases a firm may use a quantity of home market good equal to, and having the same quality and characteristicsas, the exported goods as a substitute for them in order to benefit from this provision if the import and the corresponding export operations both occur within a reasonable time period, normally not to exceed two years.

(Footnote continued)

government action to a specific enterprise or industry or group of enterprises or industries. 1/ The Trade Agreements Act of 1979 represents the United States' implementation of the agreements reached during the Tokyo Round of trade negotiations. While the Trade Agreements Act is intended to be consistent with the United States' understanding of its obligations under the Agreements, the Act is independent of the Subsidies Code. As the Senate Finance Committee noted:

> Our trade laws are, and long have been, subject to administratiuve and judicial review processes. These processes both lead to and require greater precision in our law than the rather vague terms of the agreements or implemenmting regulations of other countries. Furthermore, unfamiliar terms in the agreements, or terms which may

---

(Footnote continued)

(j) The provision by governments (or special institutions controlled by governments) of export credit guarantee or insurance programs, of insurance or guarantee programs against increases in the costs of exported products or of exchange risk programs, at premium rates, which are manifestly inadequate to cover the long-term operating costs and losses of the programs.

(k) The grant by governments (or special institutions controlled by and/or acting under the authority of governments) of export credits at rates below those which they actually have to pay for the funds so employed (or would have to pay if they borrowed on international capital markets in order to obtain funds of the same maturity and denominated in the same currency as the export credit), or the payment by them of all or part of the costs incurred by exporters or financial institutions in obtaining credits, in so far as they are used to secure a material advantage in the field of export credit terms. Provided, however, that if a signatory is a party to an international undertaking on official export credits to which at least twelve original signatories to this Agreement are parties as of 1 January 1979 (or a successor undertaking which has been adopted by those original signatories), or if in practice a signatory applies the interest rates provisions of the relevant undertaking, an export credit practice which is in conformity with those provisions shall not be considered an export subsidy prohibited by this Agreement.

(l) Any other charge on the public account constituting an export subsidy in the sense of Article XVI of the General Agreement.

This Illustrative List is incorporated by reference into U.S. law, 19 U.S.C. §1677(5)(A). However, this is not an exhaustive list and certain payments or arrangements not contained in the list may be considered countervailable export subsidies under U.S. law. Also note that the Commerce Department, in deciding whether subsidies are countervailable under U.S. law, has established its own definition of "export credit" for the purpose of the exception contained in paragraph (k).

1/ The Commerce Department has interpreted this to mean that "generally available" subsidies are not countervailable. This interpretation was found to be in error when applied to the facts in Cabot Corporation v. United States, 9 C.I.T., Slip Op. 85-102 (Oct. 4, 1985).

> have a different meaning in United States law than in international practice or another country's laws, need to be rendered into United States law in a way that ensures maximum predictability and fairness. 1/

That is, a United States person wishing to institute a trade action against imports of foreign aircraft allegedly benefiting from unfair subsidies must look to the U.S. law directly rather than to the Subsidies Code or the GATT to determine whether a particular subsidy is countervailable. 2/ Examples of foreign domestic subsidies that may be countervailable under U.S. law are: provision of capital, loans or loan guarantees on terms inconsistent with commercial considerations; the provision of goods or services at preferential rates; the grant of funds or forgiveness of debt to cover operating losses sustained by a specific industry; or the assumption of any costs or expenses of manufacture, production or distribution. 3/

Several of the foreign subsidies practices discussed in this report 4/ such as government loan guarantees, flexible repayment term loans, tax exemptions, government equity participation on a non-commercial basis, and export financing and credits may, under certain circumstances, be countervailable under U.S. law.

Within the past 5 years, two statutory investigations were conducted by the U.S. International Trade Commission on general aviation aircraft. Both cases involved commuter aircraft. The first complaint was filed by Commuter Aircraft Corp. on May 27, 1982, and alleged that the domestic industry was materially injured by reason of the sale of subsidized imported planes from France and Italy (investigations Nos. 701-TA-174 and 175). The Commission determined on July 7, 1982, that there was no reasonable indication that the U.S. industry was materially injured or threatened with injury or that the establishment of an industry in the United States was materially retarded by reason of these imports. 5/ On August 13, 1982, Fairchild Aircraft Corp. filed a countervailing duty petition alleging that the U.S. industry was materially injured owing to the importation of Brazilian commuter aircraft. On September 27, 1982, the Commission determined that there was no reasonable indication of such injury or threat thereof. 6/ These are the only investigations regarding commuter aircraft that have been filed with the

---

1/ S. Rep. No. 249, 96th Cong., 1st Sess., 36 (1979).

2/ A discussion of types of subsidies the Commerce Department has viewed as countervailable under U.S. law can be found in The Commerce Department Speaks on Import Administration and Export Administration 1984, Vol. 1 (PLI 1984).

3/ 19 U.S.C. §1677(5)(B).

4/ See section on Foreign Government Involvement. Some of the restrictive practices, such as countertrade requirements, are not explicitly covered by any of the Codes or U.S. law and have not been specifically ruled improper under the GATT.

5/ For views of the Commission, see pages 3-24 in Certain Commuter Airplanes from France and Italy: Determination of the Commission in Investigations Nos. 701-TA-174 and 175 (Preliminary). . ., USITC Publication 1269, July 1982.

6/ For views of the Commission see pages 3-20 in Certain Commuter Airplanes from Brazil: Determination of the Commission in Investigation No. 701-TA-188 (Preliminary). . ., USITC Publication 1291, September 1982.

Commission under U.S. trade laws from 1980 to date. Since both of these investigations were terminated pursuant to preliminary negative determinations by the Commission, the Commerce Department has not made any determination under the provisions of the Trade Agreements Act of 1979 as to the countervailability of any of the subsidies allegedly involved in the production of this sort of aircraft in other countries.

Many of the subsidies used by foreign governments to support their civil aircraft industries are domestic production subsidies, as opposed to export subsidies. Domestic subsidies are potentially actionable under the Subsidies Code in certain circumstances, but are not explicitly proscribed as are export subsidies. 1/ Signatories to the Subsidies Code have agreed to avoid causing through the use of such domestic subsidies: (1) injury to the domestic industry of another signatory; (2) nullification or impairment of the benefits accruing to another signatory under the GATT; or (3) serious prejudice to the interests of another signatory. 2/ The first of these, injury to the domestic industry, refers generally to the countervailability of the duties when products are exported to the United States. These may be dealt with under U.S. law as discussed above. 3/ With respect to the adverse effects in third markets or in the domestic market of the subsidizing country, such domestic production subsidies are actionable only under the second and third standards, nullification and impairment or serious prejudice.

Nullification and impairment or serious prejudice may arise through:

(a) the effects of the subsidized imports in the domestic market of the importing signatory,

(b) the effects of the subsidy in displacing or impeding the imports of like products into the market of the subsidizing country, or

(c) the effects of the subsidized exports in displacing the exports of like products of another signatory from a third country market. 4/

These are obviously difficult standards to satisfy and complaints filed with respect to them under the Subsidies Code conciliation and dispute resolution mechanisms will necessarily have a lesser chance of success than a challenge to explicitly proscribed export subsidies.

As noted above, U.S. individuals or corporations may petition the President under sections 301-306 of the Trade Act of 1974 to institute consultations or proceedings under the dispute resolution procedures of the

---

1/ Export subsidies used by developing countries are not necessarily proscribed. They are only actionable if they cause "serious prejudice" to another signatory's domestic industry. Subsidies Code, Art. 14(2)-(3).

2/ Subsidies Code, Art. 8(3), Art. 11(2).

3/ Under U.S. countervailing duty law, if a countervailable subsidy is considered a domestic subsidy rather than an export subsidy it will generally result in a lower ad valorum duty imposed with respect to that subsidy and, consequently, less relief to the U.S. industry.

4/ Subsidies Code, Art. 8(4).

relevant Code or the GATT to attempt to eliminate the offending foreign practice. 1/ When dealing with restrictions on imports of U.S. aircraft into foreign countries 2/ a section 301 petition is the only available redress under U.S. law for private persons. The distinction between proscribed export subsidies and potentially actionable but not necessarily prohibited domestic subsidies is reflected in the language of section 301. The President is authorized to take actions against foreign trade practices that are unjustifiable, unreasonable or discriminatory and burden or restrict U.S. commerce. 3/ The statute defines "unreasonable" to mean:

> . . .any act, policy, or practice which, while not necessarily in violation of or inconsistent with the international legal rights of the United States, is otherwise deemed to be unfair or inequitable. 4/

In contrast, "unjustifiable" is defined to mean:

> . . . any act, policy, or practice which is inviolation of, or inconsistent with, the international legal rights of the United States. 5/

Thus, "unreasonable" would apply to domestic subsidies that cause nullification and impairment or serious prejudice, and "unjustifiable" would apply to proscribed export subsidies. While the statute makes this distinction, it provides no explicit differentiation in the burdens which must be met for a complaint against an unreasonable practice rather than an unjustifiable one. 6/ However, as a practical matter, a person filing a petition complaining of an allegedly harmful, but not explicitly proscribed foreign practice will obviously have more difficulty establishing its case. This may be one reason why no petitions have been accepted and investigations begun under section 301 on commuter and business aircraft.

1/ It should be noted that the President is empowered under section 301 to take retaliatory action in an attempt to eliminate certain foreign trade practices regardless of whether such retaliation is authorized or explicitly permitted by the GATT or the Codes. See S. Rep. No. 1298, 93d Cong. 2d Ses. at 166 (1974).

2/ See section on Nontariff Barriers to Export.

3/ 19 U.S.C. § 2411(a)(1)(B)(ii).

4/ 19 U.S.C § 2411(e)(3).

5/ 19 U.S.C § 2411(e)(4).

6/ Section 301(a)(1)(B)(ii), which deals with "unjustifiable" and "unreasonable" practices, does include an extra requirement that the practice in question must be shown to "burden or restrict United States commerce." To the extent that unreasonable, but not necessarily proscribed foreign practices must come within the purview of this subparagraph, there is an extra burden that must be met by the petitioner. However, such a petition could also arguably be filed under § 301(a)(1)(A), which deals with policies or practices that are "inconsistent with the provisions of, or denies benefits to the United States under, any trade agreement." There is some overlap in the provisions of § 301(a).

Level and trends of U.S. imports

Total U.S. imports of commuter and business aircraft totaled 181 planes, valued at $767.4 million, in 1984 compared with 294 aircraft, valued at $551.7 million, in 1980 (table 18). This represents a decrease in quantity of 38 percent but an increase in value of 39 percent. Imports of new aircraft, in quantity, declined owing to the U.S. recession in 1981-83, the availability of used aircraft, and uncertainty regarding the potential changes in the U.S. tax law. During 1980-84, imported aircraft consisted primarily of larger, more expensive turboprops and jets. 1/

Table 18.--Commuter and business aircraft: U.S. imports for consumption, by types, 1980-84

Item	1980	1981	1982	1983	1984
Commuter aircraft-----units--	81	75	40	59	88
Business aircraft------do----	213	243	175	91	93
Total-----------do----	294	318	215	150	181
Share change from previous year----percent--	1/	8.2	-32.3	-30.2	20.7
Commuter aircraft 1,000 dollars--	152,941	139,795	91,551	118,960	338,170
Business aircraft------do----	398,802	746,891	712,331	378,208	429,240
Total-----------do----	551,743	886,686	803,882	497,168	767,410
Share change from previous year----percent--	1/	60.7	-9.3	-38.2	60.2

1/ Not available.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

The shift in demand in the import market is clearly evident by the change in the product mix of imports of commuter aircraft. Questionnaire data indicated a move to large, 30- to 50-seat aircraft. Imports of commuter airplanes, in quantity, rose by only 7 aircraft, from 81 in 1980 to 88 in 1984. However, in value terms, imports rose by 121 percent during this same period.

The import penetration ratio for commuter airplanes (by value) fell from a high of 78.4 percent in 1981 to 70.0 percent in 1984. 2/ The most important foreign suppliers of U.S. imports of these planes included Canada, Brazil, and

1/ Imports of commuter and business aircraft are not separately classified in the TSUSA, therefore a specific product breakdown of imports by country is not available. Data relating to country of origin of imports were gathered during this investigation but are business confidential.

2/ The level of import penetration declined in 1984 due to an increase in the quantity of aircraft sold by U.S. producers, not an increase in the unit value of the aircraft sold.

Great Britain during 1980-84. Other suppliers were Northern Ireland, Spain, and Sweden. Detailed information on these suppliers can be found in appendix F.

Imports of business aircraft totaled 213 units, valued at $398.8 million, in 1980. By 1984, the number of aircraft imported had declined to 93, but the value had risen to $429.2 million. 1/ Over 83 percent of the quantity and 99 percent of the value of these imports were turboprop and/or jet-powered airplanes in 1984. Increased deliveries of these medium- and large-size business planes built in Canada, France, and Israel account for much of the recent growth in import value.

The trade deficit in commuter aircraft totaled $122.2 million in 1980, as shown in figure 3. This figure declined to $68.3 million during 1981-82. By 1984, however, imports exceeded exports by $333.3 million. Exports exceeded imports of business aircraft by $262.3 million in 1980. The industry recorded a trade deficit, however, in all of the following years. The deficit totaled $11.3 million in 1981 and $168.5 million in 1984.

Several purchasers of commuter aircraft indicated, in response to Commission questionnaires, that they bought foreign-made aircraft because, in most instances, there were no comparable U.S.-manufactured products available that adequately met the performance criteria required for their routes. Companies purchasing foreign-built business aircraft stated that they made their purchases because these planes were generally less expensive to acquire than comparable U.S. products.

Major Foreign Competitors

Currently there are approximately 14 foreign-based manufacturers that are in direct competition with the U.S. industry. A few of these countries (including Brazil and Japan) that produce commuter and/or business aircraft have targeted 2/ aerospace for development. An aircraft industry can often spur high-technology advances in other areas, provide employment, and offer a certain amount of world prestige. A successful general aviation industry can also help reduce the cost of providing military industrial capacity. Another benefit of an indigenous aircraft industry is the fact that the exportation of commuter and business aircraft, which are relatively high-value goods, provides foreign currency.

General aviation is especially attractive, because it allows a country to become involved in aircraft manufacture without the sizable capital expenditure that would be required for the production of large transport

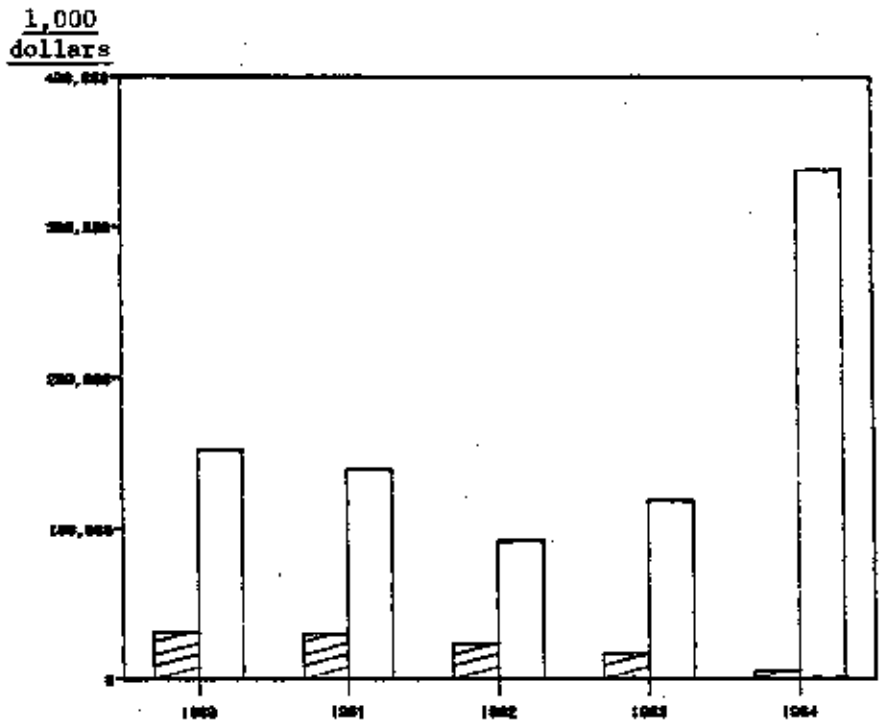
---

1/ In business aircraft, there is one Japanese-owned producer, Mitsubishi Aircraft International, which assembles jet-powered aircraft in the United States from kits consisting of the fuselage and empennage that are manufactured in Japan. For purposes of this investigation, these aircraft are considered imports.

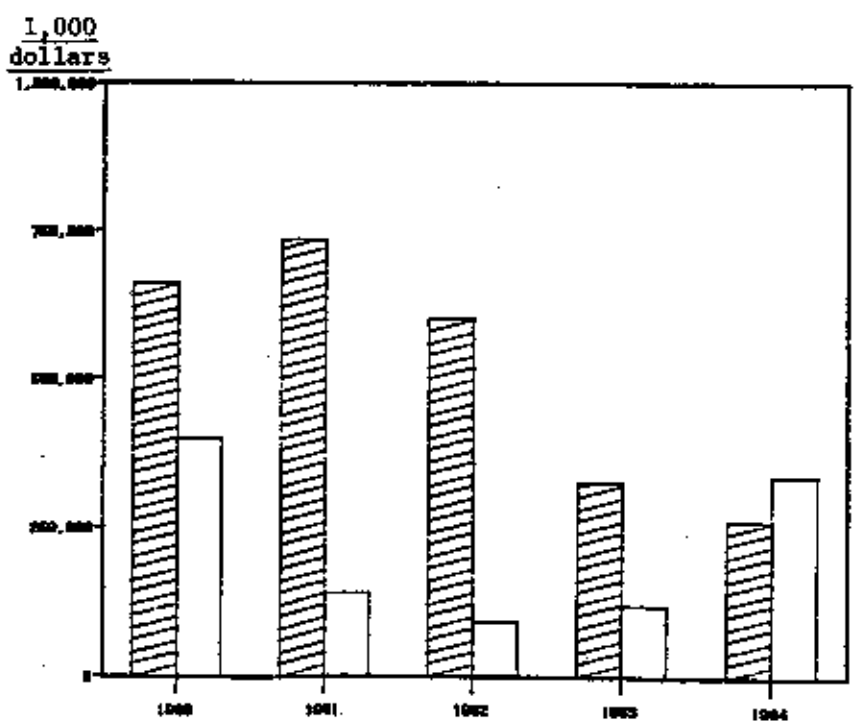
2/ Industrial targeting consists of coordinated government actions taken to direct productive resources to help domestic producers in selected industries to become more competitive. These government actions can be incentives or restrictions.

Figure 3.--U.S. exports and imports of commuter and business aircraft, 1980-84.

Commuter aircraft



Business aircraft



Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

aircraft. Commuter and business aircraft are often more compatible with the resources of individual companies and countries. 1/ Also, as discussed earlier in this report, an even more cost-effective way to enter these industries is through licensing arrangements or joint ventures. Several of the foreign aircraft producers competing with domestic manufacturers have been, or are currently engaged, in these types of relationships. A few of these producers have indicated that their collaborative ventures greatly assisted their introduction into actual aircraft manufacturing. Appendix F includes a detailed discussion of the major manufacturing countries of commuter and business aircraft manufacturing countries and, to the extent the data are available, the policies of their governments that influence general aviation manufacturing and marketing activity.

U.S. Exports

Description of foreign markets

Export sales are very important to commuter and business aircraft manufacturers, as the economies of scale involved with additional sales can lower a firm's unit costs significantly, improve profitability, and increase overall competitiveness. Additional benefits of aerospace exports are often difficult to quantify, but industry sources assert that an existing well-trained labor force working in well-equipped factories are important national assets. 2/

In a study done in June 1982 for the Aerospace Industries Association of America on the benefits of aircraft sales to the U.S. economy, Chase Econometrics Data Group found that for each $1 billion increase in aircraft-related exports, an addition of 44,700 full-time equivalent man-years in the aircraft industry would result. During 1982-1990, each $1 billion increase would ultimately result in a $6.5 billion rise in the gross national product because of the economic multiplier effect and supplier sales. Further, a total employment increase of 148,400 full-time equivalent man-years would occur during the 8-year period, with almost 30 percent of this employment occurring in the aerospace sector. 3/ However, it is important to note that this study assessed data for the entire aerospace sector, and there are significantly fewer follow-on supplier sales and a smaller multiplier effect in the commuter and business aircraft industry. Therefore, the corresponding increases in both employment and GNP would be less. However, these data do serve to illustrate the great importance of aircraft exports, including general aviation, to the overall health of the U.S. economy.

Commuter aircraft.--In most countries outside the United States, the air transportation system is highly regulated by the National or State Governments, and, therefore, there is no developed regional airline industry similar to that which exists in the United States. This regulation, even when it allows for the establishment of commuter operations, often dictates high

---

1/ Ibid.

2/ Aerospace Industries Association of America, National Benefits of Aerospace Exports, June 1983, p. 14.

3/ Ibid.

fares. 1/ Additionally, in many foreign countries, the major air carriers are owned by the government, and standards effectively prohibit the existence of small carriers because of the fear that they could divert passengers from the major airlines. This is the case in Japan, where these regulations prohibit growth of a market already small. Currently, there are only seven regional-type airlines operating in Japan. 2/ In Europe, the rules of the European Economic Community permit free access to air routes only between relatively minor airports that do not serve the main areas. Also, aircraft operating on these specified routes cannot exceed 70 passenger capacity. 3/ Only recently, the European Parliament submitted advice to the full European Community to allow member nations to follow a "go-slow" approach to airline regulation in Europe, allowing nations to delay deregulation for up to 14 years. 4/ As of September 1, 1985, the Civil Aviation Authority of Great Britain liberalized domestic fares, but will not proceed with deregulation of the air transportation system for several years. 5/ Spain has also decided to decentralize its air transportation system, allowing fare liberalization and the formation of 5 new regional airlines. 6/ The Netherlands, Luxembourg, Belgium, and West Germany have also demonstrated a willingness to relax their regulatory policies. 7/ In Canada, a form of relaxed airline regulation has been in effect since June 1984. Recent proposals to further deregulate that nation's air transportation system have been met with severe criticism from both airlines and the involved employee unions. 8/ Australia is also seriously considering deregulation.

Many areas, Europe being the most prominent example, have modern, efficient, rail transportation systems that serve many of the potential markets that a commuter airline might serve. Political problems concerning routes and licenses have also slowed development of commuter airline operations. Despite these restrictions, there are commuter airlines operating throughout Europe, Australia, and some parts of Asia. In general, regional airlines in Western Europe and Scandinavia operate as private and independent firms, as a subsidiaries supporting one or more major carriers, or as partners to major carrier but without any investment by the carrier. 9/ There are currently at least 18 commuter airlines operating in Europe. 10/ Worldwide shipments of commuter aircraft, by sources, are shown in table 19.

1/ Interviews with officials of Aer Lingus, May 1985.
2/ "Commuter Airlines In Japan, "Commuter-World, July-August 1985, pp. 12-13.
3/ "Regionals Around the World," Interavia, April 1985, p. 324.
4/ "Europeans Advise Slow Deregulation Approach," Aviation Week & Space Technology, Sept. 23, 1985, p. 39.
5/ "Commuter View," Commuter World, September-October 1985.
6/ Alison Chambers, "Spain Liberalises," Commuter World, November 1985-January 1986, p. 23.
7/ Chris Cooper, "The Basic Commuter Airport," Commuter World, November 1985-January 1986, pp. 42-43.
8/ Hugh Whittington, "Deregulation: A Wise Initiature," Canadian Aviation, September 1985, p. 2.
9/ "Beating the Barriers," Commuter Air, October 1985.
10/ "1985 European Regional Yearbook," Commuter Air, October 1985.

Table 19.--Commuter and business aircraft: Worldwide shipments of new turboprop and jet aircraft, by types, and major producing countries, 1980-84

(In units)

Item	1980	1981	1982	1983	1984
Commuter aircraft:					
United States	1/	63	57	70	75
Canada	95	75	39	12	25
Brazil	52	57	34	19	5
Great Britain	1/	10	5	32	42
Northern Ireland	0	0	14	33	33
Spain	25	30	24	0	0
France	0	0	0	0	0
Indonesia	0	0	0	0	0
Sweden	0	0	0	0	11
West Germany	2/	2/	3/ 16	3/ 27	32
Netherlands 3/	34	34	26	32	28
Total	2/	2/	215	225	251
Business aircraft:					
United States	975	1,230	768	470	388
Canada	36	19	39	44	20
France	34	19	26	13	12
Israel	40	42	23	22	16
Japan	55	44	29	43	15
Great Britain	37	34	28	19	23
Brazil	9	13	3	3	1
Italy	4/	4/	4/	4/	4/
Total	1,186	1,401	916	614	475
Grand total	2/	2/	1,131	839	726

1/ Data are business confidential.
2/ Not available.
3/ Estimated on the basis of production data by the staff of the U.S. International Trade Commission.
4/ Data are not available, but are believed to be insignificant.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission, and data provided by Beech Aircraft Corp. and the General Aviation Manufacturers Association, except as noted.

Business aircraft.--During the past decade, business aircraft have played an increasingly important role in many areas outside the United States. Worldwide business aircraft shipments are shown in table 19. According to industry data, there were approximately 13,205 business jets and turboprops in service in the free world in August 1985. This represents an increase of 4 percent from the world fleet of jet- and turboprop-powered business aircraft in 1984. The vast majority of these planes were in use in North America, as shown in table 20. Data are not available, however, on the number of piston-powered business aircraft operated worldwide.

Table 20.--Jet- and turboprop-powered business aircraft: Number of aircraft operated worldwide, by areas, 1984

Area	Business jets	Business turboprops	Total
North America	4,466	5,812	10,278
Europe:			
United Kingdom	100	102	202
West Germany	61	112	173
France	83	86	169
Italy	72	26	98
Switzerland	63	28	91
Sweden	22	34	56
All other	97	127	224
Total Europe	498	515	1,013
South America:			
Venezuela	43	166	209
Brazil	72	115	187
Argentina	25	74	99
Colombia	6	88	94
All other	17	39	56
Total South America	163	482	645
Asia	218	175	393
Africa	138	218	356
Oceania	53	110	163
All other	189	168	357
Grand total	5,725	7,480	13,205

Source: "World Business Aviation Fleet, A Statistical Guide," Interavia, August 1985, pp. 9-11.

The United Kingdom has the largest number of these business jets and turboprops in Europe, followed by West Germany and France. In South America, Venezuela and Brazil have the largest business aircraft fleets.

The leading aircraft types in use in the Western World in 1985 are shown in the following tabulation: 1/

Aircraft	Type	Number in use
Beech King Air	Turboprop	3,223
Gates Learjet	Jet	1,333
Cessna Citation	Jet	1,282
Gulfstream Commander	Turboprop	998
Piper Cheyenne	Turboprop	932
Dassault Falcon	Jet	721
Mitsubishi MU-2	Turboprop	631

1/ Ibid.

Although the United States has supplied over three-fourths of the jet and turboprop business aircraft used in the world, U.S. manufacturers indicated that foreign competitors are making important inroads in many of their traditional export markets. The domestic industry cites the value of the U.S. dollar and heavy price discounting by government-owned firms as the reasons for this increased competition. During 1980-84, the important export markets for business airplanes included Europe and Africa, according to data received in response to Commission questionnaires.

Tariffs and international agreements affecting exports

The Multilateral Trade Negotiations (MTN) Agreement on Technical Barriers to Trade, commonly referred to as the Standards Code, was negotiated during the Tokyo round of trade negotiations ending in 1979. This agreement was developed to discourage discriminating manipulations of product standards, testing, and certification systems and requires countries to use open and nondiscriminatory procedures when they adopt product standards that can affect international trade. In article 3 of the Agreement on Trade in Civil Aircraft, it is explicitly stated that the disciplines of the Standards Code apply to civil aircraft certification requirements as well as to specifications concerning aircraft operating and maintenance procedures. With the exception of Israel, all of the countries that offer commuter and/or business aircraft in the world market are signatories to the Standards Code.

In November 1983, the United States and Israel agreed to begin discussions toward the establishment of a bilateral Free Trade Area (FTA). Negotiations were concluded, and on September 1, 1985, the U.S.-Israel Free Trade Area Agreement was implemented. U.S. Government officials indicate that the primary benefit of the arrangement will be expansion of commerce between the two countries because of the elimination of customs duties and nontariff barriers. Although the duty reduction will have no effect on commuter and business aircraft, as imports of these products enter Israel duty free, the agreement provides for Israel to eliminate its export subsidy program over a short period of time. The FTA agreement also includes Israel's assurance that it will sign the Subsidies Code, which explicitly forbids the use of export subsidies and sets out broad guidelines on the use of domestic subsidies. Export credit subsidies, provided by Israel as well as numerous other foreign aircraft-producing countries, have been cited by general aviation manufacturers as adversely affecting their competitiveness abroad.

The U.S. Government is presently involved in negotiations to formulate an international understanding regarding export financing of general aviation aircraft. A similar agreement involving large transport airplanes with more than 70 passengers was adopted by the major producers on July 1, 1985. Currently, export financing for commuter and business aircraft sales are covered under the Standstill Agreement discussed earlier in this report.

Nontariff barriers to exports

Because of the importance of exports to the general aviation industry, free and fair access to foreign markets is critical to their international success. As discussed earlier in this report, the Agreement on Trade in Civil

Aircraft provides a framework for free trade in commuter and business aircraft. With respect to nontariff barriers, the agreement incorporates the provisions of the GATT codes on subsidies and countervailing duties and on technical barriers to trade, as they pertain to civil aircraft. 1/

Despite these multilateral disciplines, U.S. producers consistently assert that numerous countries have erected nontariff barriers, which effectively prohibit the sale of domestically produced airplanes. Table 21 lists the nontariff barriers most frequently encountered by U.S. manufacturers in the specific overseas markets. Questionnaire responses indicate that restrictions such as licensing requirements, quotas, import permits, and exchange controls are most prevalent in Brazil and Mexico. Nontariff charges on imports were also noted in Argentina, Brazil, Mexico, Bolivia, and Norway. Cumbersome customs paperwork requirements were noted in exporting aircraft to the EC. 2/

Table 21.--Commuter and business aircraft: Nontariff barriers experienced by U.S. producers in foreign markets, by countries, 1980-85

Category	Country(ies)
Quantitative restrictions and similar specific limitations:	
Licensing requirements	China, Austria, Portugal, Brazil, and Soviet Union.
Quotas	Brazil, Soviet Union, Indonesia, Mexico, and Israel.
Import permits	Brazil and Pakistan.
Embargos	Brazil, Soviet Union, Columbia, Paraguay.
Export restraints	China, South Africa, Soviet Union.
Exchange and other monetary of financial controls	Mexico, Brazil, Venezuela, Argentina, India, Soviet Union, and Paraguay.
Nontariff charges in imports:	
Discriminatory sales taxes	Argentina, Brazil, Mexico.
Prior import deposits	Brazil, El Salvador, Paraguay.
Local-content requirements	Australia, and China.
Countertrade/offset requirements	Italy, Australia, Indonesia, China.
Consular fees	Bolivia, Norway.

1/ Data provided by the Office of the United States Trade Representative (USTR). Officials at USTR indicate, however, that sects. B and C of art. XVIII of the GATT permit developing nations to adopt, under certain conditions, trade-restricting measures normally inconsistent with the GATT. The rationale for such protectionism is usually to adjust balance-of-payments problems or promote an infant industry.

2/ Ibid.

Table 21.--Commuter and business aircraft: Nontariff barriers experienced by U.S. producers in foreign markets, by countries, 1980-85--Continued

Category	Country(ies)
Government participation in trade:	
Subsidies and other aids	Brazil, Indonesia, Canada.
Health and safety standards	Australia, Japan, Switzerland.
Marking requirements	Austria, and West Germany.
Laws and practices that discourage imports	Brazil and Indonesia.
Customs documentation requirements	European Community.

1/ Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Many of these barriers have been encountered in countries that have a commuter or business aircraft industry or are attempting to develop such an industry. One of the most noted examples of this is Brazil, which imposed duties and taxes on general aviation aircraft, effectively prohibiting imports of U.S.-built planes. The duty rates and taxes on Brazilian imports of commuter and business aircraft which existed prior to January 1986 are shown in the following tabulation: 1/

Type	Duty	IPI tax
Propeller airplanes	50	10
Turboprop airplanes, less than 7,000 kg	50	10
Turboprop airplanes, over 7,000 kg	50	10
All other turboprop airplanes	50	10
Turbojet airplanes, less than 7,000 kg	7	10
Turbojet airplanes, 7,000 to 20,000 kg	7	10
Turbojet airplanes, over 20,000 kg	2	10
Parts of aircraft	50	10

Representatives of U.S. aircraft manufacturers in Brazil indicate that duties were normally waived for aircraft imported by air taxis, aero clubs, and Government agencies. 2/ Additionally, in order to be granted an import license, approval must be granted by the Civil Air Transport Coordinating Commission of the Brazilian Government. Industry sources note that import licenses are usually not granted for products that are even broadly competitive with planes produced in Brazil. In conjunction with the licensing requirements, a branch of the Brazilian Central Bank must review the application in order to ensure that adequate levels of foreign exchange are available to finance the import and that loan terms conform to national law.

1/ Data supplied by USTR.

2/ Interview with Mr. Daniel Martin, president, TAM, Sao Paulo, Brazil, Aug. 20, 1985.

All non-Brazilian aircraft must be financed externally. In general, aircraft valued at less than $300,000 must be financed for 3 years; the aircraft loan term for planes valued between $300,000 and $1 million cannot exceed 5 years. For planes that cost over $1 million, the loan term is 8 years. 1/

U.S. commuter and business aircraft distributors located in Brazil state that there are also additional financing taxes, import permit fees, and landing fees required for purchases of planes not manufactured in Brazil. Data indicate that the final purchaser cost of a $100,000 U.S.-built aircraft sold in Brazil in 1985 exceeded $227,000. 2/ Because of this cost and the fact that the licensing procedure is both cumbersome and burdensome, many U.S. producers have indicated a reluctance to apply for import permits. Between 1980 and 1984, only 61 import licenses were granted for U.S. business and commuter aircraft. Over one-third of these licenses were for business jets, a product not produced in Brazil. It is important to note that these figures do not represent actual imports, which may in fact be considerably lower because obtaining import licenses for the same aircraft may require application several times. 3/ However, during the course of the U.S.-Brazil trade subgroup meetings in December 1985, the Government of Brazil informed the United States that Brazil would unilaterally take steps to lower tariffs and liberalize licensing procedures for general aviation imports. The Government of Brazil implemented this new policy in January 1986. 4/ The Brazilian decision has met with favorable reaction from many in the United States who have expressed the hope that it will lead to additional opportunities for U.S. manufacturers to sell commuter and business aircraft in Brazil. 5/

Indonesia is another important market that has imposed barriers to U.S. general aviation exports. In 1980, Indonesia enacted a law virtually prohibiting the importation of 19 to 35 passenger aircraft, with the exception of Indonesian joint ventures, from international manufacturers. 6/ It is expected that the Government of Indonesia will impose an import ban for aircraft similar to the CN 235 (44 passengers) when the aircraft is certified. 7/ Officials of Nurtanio, the Indonesian producer, rationalize this with the infant industry argument, stating that the domestic aircraft producer needs time and a secure market to develop.

Embargoes and currency restrictions have also recently been encountered in several South American countries facing severe international debt crises. Requirements for countertrade or offset purchases 8/ are increasingly being indicated by domestic manufacturers as a hindrance to their exports.

1/ Ibid.
2/ Ibid.
3/ Data supplied by USTR.
4/ Data provided by the Government of Brazil, January 1986.
5/ "News From Senator Bob Dole," Washington, D.C., Dec. 13, 1985.
6/ Executive Office of the President, Annual Report on National Trade Estimates 1985, 1985.
7/ Speech by Mr. Eric Sletten, Assistant Commercial Attache, American Embassy, Jakarta, Indonesia, at the Aerospace Industries Association and U.S. Department of Commerce Joint Conference on the Pacific Rim Basin, Dec. 5, 1985.
8/ Offset purchases consist of industrial compensation practices required as a condition for an aircraft sale. This includes licensed production, subcontractor production, overseas investment, and technology transfer.

Countries such as Italy, Australia, China, and Indonesia were noted as having either official or unofficial requirements in this area. An additional problem noted by U.S. manufacturers is the complex or expensive certification procedures in developed countries that have existing manufacturing capabilities for commuter or business airplane manufacturing.

Level and trends of U.S. exports

Export shipments reported by producers in response to the Commission's questionnaire totaled 2,604 units, valued at $764.9 million, in 1981, as indicated in table 22. Total exports declined in each year during 1981-84, falling to only 321 units, valued at $265.7 million, in 1984. U.S. exports of commuter aircraft followed a parallel trend, decreasing from 18 planes, valued at $29.4 million, to 3 planes, valued at $4.9 million, during the period. Business aircraft export shipments fell from 3,349 units, valued at $661.1 million, in 1980 to 318 units, valued at $260.8 million, in 1984. The unit value of commuter aircraft exports rose from $1.6 million in 1981 to $1.8 million in 1982 before returning to $1.6 million in 1984. Business aircraft exports were dominated by smaller aircraft. The average unit value of these exports rose from $197,388 in 1980 to $820,063 in 1984.

Table 22.--Commuter and business aircraft: U.S. producers' export shipments, by types, 1980-84

Type	1980	1981	1982	1983	1984
	Quantity (units)				
Commuter aircraft	1/	18	13	12	3
Business aircraft	3,349	2,586	1,232	607	318
Total	1/	2,604	1,245	619	321
	Value (1,000 dollars)				
Commuter aircraft	1/	29,357	23,231	16,745	4,913
Business aircraft	661,052	735,571	603,492	326,472	260,780
Total	1/	764,928	626,723	343,217	265,693
	Unit value				
Commuter aircraft	1/	$1,630,944	$1,787,000	$1,395,417	$1,637,667
Business aircraft	197,388	284,444	489,847	537,845	820,063
Average	1/	293,751	503,392	554,470	824,589

1/ Data are business confidential.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

As shown in the following tabulation, as a percentage of U.S. production, exports of commuter and business aircraft (by value) were 3 and 17 percent, respectively, in 1984 (in percent): 1/

Year	Commuter aircraft	Business aircraft
1980----------	1/	41
1981----------	43	35
1982----------	40	38
1983----------	18	28
1984----------	3	17

1/ Not available.

The U.S. general aviation industry has historically exported 25 to 30 percent of its production, with a large portion of these exports being commuter and business airplanes. The reasons given for the decrease in exports include the value of the U.S. dollar, tariff and nontariff barriers in many traditional foreign markets, and increased competition from foreign producers. Other factors responsible for this decline, noted by industry analysts, include the high cost of aviation fuel in many countries outside the United States and the high cost of U.S.-built aircraft.

Although the strong dollar can often assist foreign aircraft manufacturers in their penetration of the U.S. market (through its lowering of a plane's purchase prices), it has been noted by the U.S. industry as being a severe handicap to them in efforts to sell U.S.-built commuter and business aircraft abroad. This is due to the fact that initial purchase price, spare parts, fuel, air traffic controller fees, and other costs are paid in U.S. dollars. 2/ For example, the price of a $2.5 million U.S. aircraft has increased in U.S. dollars in line with inflation and product improvements, but in non-U.S. currency, the price has increased almost fourfold in 7 years. 3/ Every domestic manufacturer surveyed by the Commission in the course of data collection in this study blames the high value of the U.S. dollar vis-a-vis other currencies as one of the most important reasons for declining exports. In Europe, for example, the strong dollar has been indicated as a major factor in the near-zero growth in corporate aircraft exports in recent years.

In response to Commission questionnaires, commuter aircraft manufacturers indicated that their most significant competitors in foreign markets come from producers in the Great Britain, Brazil, and Canada. Producers noted that in recent years, Northern Ireland and West Germany have become important competitors in the nonpressurized commuter airplane market. Business aircraft manufacturers stated that during 1980-84, the majority of their third-market competition came from France, Canada, Israel, and Great Britain.

1/ Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

2/ Michael Feazel, "Economic, Political Factors Stifle Demand For New Aircraft In Europe," Aviation Week & Space Technology, Oct. 1, 1984, p. 93.

3/ David Woolley, "Regionals Around the World," Interavia, April 1985, p. 324.

Internationalization

The increasing internationalization 1/ of the aircraft industry during the last decade has also had its effects on general aviation aircraft. Cooperative programs, ranging from subcontracting to complete joint production, are being used to spread the risks and rising costs among world producers of developing new commuter and business aircraft. Many of the existing international partnerships have, in fact, been formed out of necessity for the reasons outlined above, or to sell in certain foreign markets. Several respondents to the Commission's questionnaires indicated that they had, in fact, initially established foreign licensing agreements in anticipation of, or in response to, foreign-market access restrictions.

Benefits through collaborative foreign ventures allow the joint-venture companies to mutually share research and develop technology at a fraction of the normal cost by sharing the task. The cost and complexity of developing new aeronautical systems have increased greatly in recent years. Changes in environmental and safety regulations have imposed new constraints on designs that have led to additional cost burdens and a need for new technology. Companies involved in joint ventures combine their technologies to create projects that, in many cases, neither firm would have attempted individually. Also, partner companies can better manage their resources, facilitating personnel adjustments and changes in capital and production where necessary. Industry officials assert that internationalization may also enable the aircraft to be more cost competitive because of the partners' ability to choose the most cost-efficient sources from a wider pool of possible subcontractors. 2/ Finally, the combined economic and political clout of the participants can frequently greatly assist in enlarging or enhancing the market base for the airplane. 3/

Another recently emerging trend is for a U.S. manufacturer to agree to employ and train a certain number of foreign aeronautical graduates for periods ranging from 1 to 3 years. Developing aircraft producers view this as an expedient way to gain both technological and marketing expertise. U.S. industry officials indicate that these agreements can often lead to further cooperative ventures between domestic and foreign manufacturers. Additionally, they could be effective in increasing market access for U.S.-built civil and military planes.

There are substantial barriers to entry in this industry, and cooperative agreements among foreign partners allow manufacturers to venture into new product areas. Often these agreements call for licensed production of an existing aircraft, beginning with shipments of kits consisting of the actual

---

1/ Internationalization is defined in the Department of Commerce International Trade Administration's report entitled, A Competitive Assessment of the U.S. Civil Aircraft Industry as transnational relationships among aircraft producers that are of a production partnership or subcontractor basis.

2/ Speech by Anthony J. Lawler, Airbus Industries of North America, Air Transportation Research International Forum, Indianapolis, Indiana, June 12, 1985.

3/ Speech by Nicholas Tomassetti, International Aero Engines AG., Airfinance Journal Conference, New York City, NY, Apr. 22, 1985.

aircraft pieces for assembly by the licensee. This is generally followed by a gradual increase in content-manufacturing responsibility, ultimately allowing the firm to produce most of the components and to assemble the airplane.

However, there are also numerous problems inherent in licensing and joint-venture arrangements. Problems can arise in terms of sources for parts or requiring dual production lines. Maintaining communications between the manufacturing centers can also be difficult and costly, especially if different languages are involved. The decisionmaking process is often very cumbersome because of the number of people and distances involved. Additionally, with the technology transfer that ultimately occurs from a licensing or joint-venture agreement, there is the risk of accelerating the technological development of an eventual competitor.

There are a number of U.S. firms currently engaged in licensing and cooperative production arrangements with foreign companies. Cessna Aircraft Co. licenses production of six of its models of general aviation aircraft for the European market to Reims Aviation, S.A., in Reims, France. Reims has been an associate of Cessna since 1960. In addition to the license of small recreational aircraft, Reims has been working with Cessna on the Caravan II, a utility aircraft that could find possible use in the commuter airline or cargo market. Piper Aircraft Corp. has had a licensed production agreement with Embraer Aircraft Corp., San Jose dos Campos, Brazil, since 1974 for the manufacture of 7 models of general aviation aircraft. However, only 6 of these planes are currently in production, and these models are not usually used in commuter or business operations. Piper also has similar licensing arrangements with Enaer S.A. of Chile, Pezetel of Poland, and Chincul S.A. of Argentina. These agreements have been in existance for at least 3 years. In addition to these established operations, Avtek Corp. recently announced that they have signed a licensing agreement with Valmet Corp. of Finland to build a derivative of their high-technology business aircraft to be used in surveillance and patrol missions. 1/

There are two current U.S. manufacturers of business and commuter aircraft that were engaged in joint production operations during 1980-85. Fairchild Aircraft Corp., in June 1979, reached agreement with Saab-Scania of Sweden on a joint feasibility study for a 30 to 40-seat aircraft suitable for commuter carriers. In September 1980, the final arrangements were made, with development, production, and marketing costs of the SF 340 to be shared roughly 65-35 between the Swedish and U.S. partners and design and production being divided approximately equally. 2/ Fairchild was originally responsible for the manufacture of the wings, engine nacelles (enclosure), and the empennage (tail section), and Saab-Scania produced the fuselage and fin and had responsibility for final assembly. Delivery of this aircraft began in 1985. However, as of November 1, 1985, Fairchild sold its share of the partnership to Saab-Scania and became a subcontractor for the SF340 program. Production is gradually being transferred to Saab, with Fairchild's involvement in the program terminating after production of the 108th SF340. 3/

1/ "Aviation Intelligence," Business and Commercial Aviation, May 1985, p. 26.

2/ "SAAB-Fairchild 340 . . ., Transatlantic Frontrunner," Air International, June 1983, pp. 267-269.

3/ "Fairchild Eases Out of SF340 Program," Commuter Air, December 1985, p. 12.

Gates Learjet Corp. signed an agreement with Rinaldo Piaggio of Italy in 1983 for the joint development of a new, twin pusher, turboprop business aircraft, originally designed the GP-180 and now called the Avanti. Under the arrangement, Gates was to design, develop, and build the cockpit and cabin sections, while Piaggio designed and developed the other sections at its plants in Genoa and Finale Ligure, Italy, and built and flight tested the first prototype. Gates was originally to assemble and flight test the second and third prototypes. However, in January 1986 Gates Learjet announced their withdrawal from the GP-180 Avanti program. Gates has offered to act as a subcontractor to the project, but as yet no decision has been made. Piaggio will continue to develop the aircraft independently or with another partner, with certification expected in the second half of 1987. 1/

There are also a number of joint ventures not involving U.S. producers. Aerospatiale of France is currently involved with Aeritalia of Italy in the production of a 46-seat commuter aircraft. A stretched version of this aircraft (72 seats) is also contemplated by the partners. CASA (Spain) has an agreement with Nurtanio (Indonesia) to manufacture a 44-seat commuter airplane. Additionally, numerous firms produce subcomponents for the aircraft covered by this study. Short Brothers PLC, of Northern Ireland, manufactures components for the Fokker F-28 and will do so for the F100, as well as engine nacelles for the BAe 146. Shorts is, in fact, investing $43 million in design, development, and production for the wing for the F-100. Fokker produces the wings for Shorts 330 and 360 model commuter aircraft. A large number of commuter and business aircraft manufacturers also license the production of their aircraft to both existing aerospace manufacturers and firms beginning aircraft operations.

Another important aspect of internationalization is the U.S. content of foreign-built aircraft. Industry sources agree that the United States has the largest, most developed aerospace component industry. These subcomponents represent an important portion of the final cost of imported aircraft. Major parts, such as engines, avionics, and environmental control systems, are almost always of U.S. origin. Additionally, brakes, wheels, tires, propellers, pumps, valves, and indicators are often made by American producers. Data provided to the Commission indicate that U.S. content of foreign-built commuter and business aircraft ranges from 12 to 80 percent. The following tabulation gives individual aircraft information: 2/

1/ "Gates Learjet Withdraws Its Support of Italian GP-180 Avanti Program," Aviation Week & Space Technology, Jan. 20, 1986, p. 25.

2/ Data compiled from responses to questionnaires of the U.S. International Trade Commission. These percentages may vary due to individual aircraft configuration.

Aircraft	Manufacturer	Share of U.S. content (Percent)
C-212	CASA	16
BAe 146	British Aerospace	44
Jetstream 31	do	30-50
125-800	do	30-60
Shorts 360	Short Brothers	26
Bandeirante	Embraer	55
Brasilia	do	69
Xingu	do	40
Challenger	Canadair	75
SF 340	Fairchild/Saab-Scania	80
Diamond II	Mitsubishi	60
F-27	Fokker	12-18
F-28	do	12-18
Falcon 10	Dassault	45
Falcon 200	do	48
Falcon 50	do	30
228	Dornier	31

Industry officials indicate that further foreign licensing and joint development and production programs can be expected as development, manufacturing, and certification costs continue to increase and as the market for the resultant commuter and business aircraft remains uncertain. U.S. content of foreign-built airplanes, however, may decline as foreign industries become more vertically integrated in their commuter and business aircraft operations.

U.S. Government Involvement

The U.S. commuter and business aircraft industries benefit both directly and indirectly from a variety of activities conducted by the U.S. Government. These actions are sponsored by a number of agencies, including the Department of Defense, Department of Transportation, National Science Foundation (NSF), National Aeronautics and Space Administration (NASA), the Department of Commerce, the Department of Labor, and the Export-Import Bank (Eximbank). Assistance is provided in the areas of procurement, research and development, tax benefits, export promotion, and export financing.

Procurement

Large Government military purchases often result in increased production runs and lower unit costs for overall commercial production. The Department of Defense has, during the past 3 years, become a purchaser of U.S.-built commuter and business aircraft. 1/ Data regarding these purchases are found

1/ The U.S. Government has also purchased foreign-built commuter aircraft for military purposes. In 1984 the U.S. Government purchased 18 commuter aircraft from Short Brothers Ltd., of Northern Ireland, to use as cargo transports for the U.S. Air Force in Europe, with an option to purchase an additional 48 planes.

earlier in this report under the discussion of U.S. shipments. It is important to note, however, that Federal procurement of general aviation aircraft is very small compared with other aerospace areas and with overall commercial production. In 1984, the U.S. Government purchased less than 5 percent of total commuter and business aircraft shipments.

Research and development

The Department of Defense also has extensive research programs oriented to manufacturing technology. The Manufacturing Technology (ManTech) Program is a broad-based, production-oriented program, the goal of which is to improve production methods to lower procurement costs. The ManTech program will not buy capital equipment, but it will provide "seed money" for projects for which feasibility has been demonstrated. ManTech results are frequently distributed to industry through the Manufacturing Technology Journal, the National Technical Information Service, the Defense Technical Information Center, and end-of-contract briefings. Although the ManTech programs tend generally to concentrate on the particular needs of the individual weapon systems, some work is done in areas that apply to general aviation and all manufacturing. These include advanced machinery, composites, electronics, and engine repair and maintenance. 1/ However, Department of Defense sources note that there was little direct benefit to individual commuter or business aircraft from the ManTech program during 1980-84.

Other Government agencies are involved in supporting manufacturing research. The NSF has a number of programs that are sources of funds for production research. The Production Research Program provides funds directly for production research; the Industry/University Cooperative Research Program, the Innovation Process Research Program, and the Small Business Innovation Program are primary sources of funds for augmenting the budget of the Production Research Program. The Social and Economic Sciences Programs and the International Programs are other sources of funds. NSF's Production Research Program has the objectives of providing financial support for research, which leads to substantially higher productivity, and insuring a sufficient number of manufacturing engineers for university faculties and industry. NSF's Production Research Program (1) identifies major research needs and acquires the necessary resources to realize those needs; (2) provides funding for research by universities and nonprofit organizations, industry/university partnerships, and small business; and (3) works with universities which are trying to establish manufacturing research programs. Other activities are the establishment of international programs, which include staff visits, planning conferences, and the exchange of engineers and participation of the Production Research Program in intra-agency and interagency activities. 2/ Table 23 depicts the NSF Production Research Program for fiscal years 1980-84.

1/ "Potential Fund Shift Stirs Some Concern About ManTech," American Metal Market, Mar. 21, 1983, p. 3A.

2/ W.M. Spurgeon, "Production Research Program, National Science Foundation," charts used in talk at the Tenth BSF Conference on Production Research and Technology, Detroit, MI, March 1983, p. 33

Table 23.--National Science Foundation Production Research Program and Augmentation funding, fiscal years 1980-84 1/

(In millions of dollars)

Item	1980	1981	1982	1983	1984
Production Research Program	2.3	2.8	3.1	3.5	4.6
Augmentation	2/ .2	3/	3/	2/ 1.5	3/

1/ Fiscal year is Oct. 1-Sept. 30.
2/ Estimated.
3/ Not available.

Source: W.M. Spurgeon, "Production Research Program, National Science Foundation," Tenth NSF Conference on Production Research and Technology, Detroit, MI, March 1983, p. 6.

The Federal Aviation Administration also performs research in the aviation sector. For fiscal year 1986, the agency has budgeted approximately $196 million for research, engineering, and development. However, well over one-half of these funds will be utilized to improve the air traffic control system. Only a small portion will be devoted to airplanes--in such areas as cabin fire safety. 1/ FAA officials indicate that little or none of their research funding is specifically targeted to commuter or business aircraft, but is more generic in nature. Research results are also available through public sources.

The National Aeronautics and Space Administration engages in long-term research on a variety of aeronautical subjects, as well as short-term technological improvements. Very little work is being conducted specifically for commuter or business aircraft. One program, however, that has been in existance since 1972 is the Small Transport Aircraft Technology program, geared toward improving efficiency and safety of general aviation aircraft. In 1979, its peak year, between $12 million and $13 million was spent for research. Since then, however, NASA officials indicate that the program has not received specific budgetary authorization, and as a result is conducting very little general aviation specific research. 2/

Langley Research Center, a NASA research facility, has 40 wind tunnels and 1,300 engineers and scientists. One of Langley's projects involves improving general aviation planes by reducing the problems of stall and spin. Work is also being performed on natural laminar flow, composites, and lighting strikes. 3/ However, only 5 percent of Langley's annual aeronautical research

1/ "FAA Will Outline Plans For Research, Development," Aviation Week & Space Technology, Aug. 5, 1985, p. 31.
2/ Data provided by Roger Winblade, National Aeronautics and Space Administration, June 1985.
3/ Robert Feeler, "Langley Research Center: A Certain Flair," Aviation Equipment Maintenance, August 1985, pp. 37-40.

budget is allocated to general aviation. 1/ Ames Research Center has also done research into canard configuration that is being used on several new technology business aircraft. 2/

U.S. Government support in research and development is provided because of the importance of the aerospace sector and the degree of Government regulation in the industry. Industry sources state that the U.S. position of leadership in general aviation technology can partially be attributed to their ability to capitalize on Federal research. 3/ Specific improvements in propulsion and aircraft structure and configuration were noted. Although specific figures are not available, it is also important to point out that the vast majority of Government-sponsored research and development programs either are directed toward large transport aircraft or are very generic in nature. The role of the U.S. Government in commuter and business aircraft has diminished considerably in recent years because of severe reductions in many of the aeronautical research programs geared toward general aviation.

Production and financial assistance

The U.S. Government does not provide direct production subsidies or grants to manufacturers of commuter and business aircraft. Tax benefits, available to all U.S. industries, provide some measure of assistance in research and development and capital investment.

In the area of tax subsidies for private-sector development and investment, the U.S. Government enacted the Economic Recovery Tax Act of 1981 (ERTA). The ERTA provided to businesses a tax credit of 25 percent of the actual increase in research and development expenditures over a 3-year base period. Other provisions of the ERTA in the area of research and development include a corporate charitable deduction for used research and development equipment 4/ and revised rules pertaining to research and development deductions allocated against U.S. source income. 5/

The ERTA also provided other tax incentives to spur new investment in production facilities, such as the ACRS and safe-harbor leasing rules, which allow firms that are in a financially precarious situation to sell their unused tax credits. However, since the ERTA's enactment in 1981, the U.S. Congress has put "new limits on the investment tax credit, repealing increases in ACRS benefits scheduled for 1985 and 1986, halving the benefits

---

1/ Aviation Week & Space Technology, Sept. 23, 1985, p. 73.

2/ Ibid., p. 76.

3/ James Bauchspies and William Simpson, ORI, Research & Technology Program Perspectives For General Aviation and Commuter Aircraft, 1982, p. ES-16.

4/ 26 U.S.C.A. 170(e) (West 1978 and supp. 1983).

5/ 26 U.S.C. 861 (supp. 1983).

of safe-harbor leasing, and then abolishing it altogether as of January 1, 1984." 1/ The Tax Equity and Fiscal Responsibility Act of 1982 reduces by 57 percent the tax benefits of 1981 when the 1982 tax act effects are calculated out to 1986. 2/ However, legislation was proposed in 1984 and 1985 to eliminate the investment tax credit and significantly modify the depreciation system, thereby raising the effective tax rate paid by owners of commuter and business aircraft.

Additionally, the Foreign Sales Corporation (FSC) Program is a U.S. tax deferral system that benefits domestic exporters. The FSC program (which replaced a similar program called the Domestic International Sales Corporation (DISC) on Jan. 1, 1985) allows firms to establish special subsidiaries that can exempt a portion of their export income from Federal income tax. The purpose of this program, according to U.S. Government officials, is to increase the international competitiveness of domestically produced articles. 3/ Although the U.S. commuter and business aircraft industries are not primary users of this arrangement, they, like all U.S. exporters, are eligible for benefits.

Regarding training of workers, the U.S. Department of Labor, under the Federal Job Training Partnership, offers training assistance to a variety of domestic industries. Although complete data regarding the extent of utilization of this program are not available, recent information shows that Labor will provide $787,473 to Beech Aircraft Corp. in 1985 to train personnel in bonding and composite fabrication skills. 4/

State Governments have also recently become directly involved in promoting high technology industries, including aircraft. Programs are known to exist in Virginia, Ohio, Florida, and Kansas. In 1984, Sedwick County, KS, agreed to issue $100 million in industrial revenue bonds to help finance capital improvements for a general aviation producer. 5/ Avtek Corp. recently obtained a $20 million finance package (in debentures) from the State of New Mexico to help develop and certify their aircraft. 6/

Export promotion and financing

Like other major industrial nations, the United States offers a variety of export promotion programs to assist domestic businesses in selling their products abroad. In this regard, the U.S. Department of Commerce, International Trade Administration, organizes overseas commercial exhibitions

---

1/ Richard I. Kirkland Jr., "Taxing the Business Lobby's Loyalty," Fortune, Oct. 18, 1982, p. 144.

2/ Ibid.

3/ Edwin Bowers, "Can FISC Hold Up With DISC Gone," Iron Age, Feb. 15, 1985, pp. 49-51.

4/ Business Aviation, Mar. 18, 1985, p. 84.

5/ Mark Twombly, "Big Four Futures," AOPA Pilot, March 1985, p. 33.

6/ "Avtek's New Home To Be Albuquerque," Aviation International News, Jan. 1, 1986, p. 6.

of domestic products and conducts trade missions and sales seminars. This agency also collects and publishes information on new business opportunities abroad and assists U.S. firms in competing for major foreign projects. 1/ Worldwide, Foreign Commercial Service (FCS) personnel in U.S. embassies work with the Commerce Department in pursuing aerospace export opportunities for U.S. firms. 2/ The FCS will frequently identify products that will sell in the international marketplace and then encourage and assist manufacturers in their efforts to seek overseas customers. 3/ U.S. commercial and business aircraft manufacturers, however, indicate that information is often received too late to provide any assistance in a foreign sale.

The Eximbank of the United States provides direct loans, loan guarantees, and loan insurance to public or private foreign buyers to finance U.S. exports. Tables 24 and 25 illustrate Eximbank support for turboprop and small jet aircraft during 1980-84. Approximately $19.7 million in loans, $35.1 million in guarantees, and $5.4 million in insurance was extended for turboprop aircraft during 1980-84. For small jet aircraft, $36.1 million in loans, $30.2 million in guarantees, and $28.2 million in insurance was given during 1980-84.

Other policies and assistance

Trade Adjustment Assistance for employees and firms is authorized by title II, chapter 3 of the Trade Act of 1974. The Trade Adjustment Assistance Program (TAA) assists employees in situations where increased imports of foreign-made products have contributed importantly to their loss of jobs. 4/ To assure that the benefits go to such workers, the law requires the Department of Labor to determine whether imports contributed importantly to job reductions in a particular company or subdivision of a company. Labor makes this determination in response to petitions from workers that have been laid off or threatened with layoffs. If the Department of Labor decides that imports were an important factor, it certifies the affected workers in that firm as having group eligibility for adjustment assistance.

The TAA provides cash benefits called "trade readjustment allowances" (TRA), training, job search and relocation allowances, and other services of employment. Workers eligible for TAA may receive the following benefits: (1) special help in finding a new job; (2) training in a new skill if suitable

---

1/ U.S. Department of Commerce, International Trade Administration, Serving American Business, April 1983, p. 2. These export promotional activities are available not only for the U.S. general aviation industry, but also provided to any domestic firm interested in exporting their products or services.

2/ "U.S. Embassy Offers Data on Industry During Show," Aviation Week & Space Technology, Sept. 3, 1984, p. 107.

3/ "World Export Sales Patterns Shift," Aviation Week & Space Technology, Sept. 3, 1984, p. 83.

4/ The TAA Program was not funded under the Congressional Continuing Resolution that became effective Dec. 20, 1985. The Office of Trade Adjustment Assistance indicates that petitions for assistance are being accepted, although only those dated prior to Dec. 20, 1985, are being instituted. Congress is expected to re-examine the program in March 1986.

Table 24.—Eximbank support for U.S. exports of turbo-prop aircraft, by types of programs, fiscal years 1980-84

(In thousands of dollars)

Program	1980		1981		1982		1983		1984	
	Export value	Authorized amount	Export value	Authorized amount	Export value	Authorized amount	Export value	Authorized amount	Export value	Authorized amount
Direct loan	—	—	5,552	2,776	—	—	—	—	—	
CFF loans 1/	—	—	1,204	512	—	—	—	—	—	
Financing guarantees	22,450	6,735	—	—	—	—	—	—	—	
Bank financing	9,849	7,836	5,047	4,057	10,664	8,106	5,735	4,600	5,334	3,734
Medium term insurance	2,664	2,053	3,940	3,346	—	—	—	—	—	
Discount loans 2/	716	2,542	4,532	3,765	15,524	10,091	—	—	—	—
Medium term credit	—	—	—	—	—	—	3/	3,100	3/	1,700
Total 4/	35,169	19,166	20,275	14,456	26,188	18,197	3/	6,700	3/	10,678

1/ Cooperative Financing Facility.
2/ In 1982, the discount loan program was replaced by the medium-term credit program.
3/ Not available.
4/ May be overstated because of the funding of certain exports under several programs.

Source: Export-Import Bank of the United States.

Table 25.—Eximbank support for U.S. exports of small jet aircraft, by types of programs, fiscal years, 1980-84

(In thousands of dollars)

Program	1980		1981		1982		1983		1984	
	Export value	Authorized amount	Export value	Authorized amount	Export value	Authorized amount	Export value	Authorized amount	Export value	Authorized amount
Direct loan	17,557	7,462	—	—	—	—	—	—	—	
CFF loans 1/	8,591	4,125	1,499	637	—	—	—	—	—	
Financing guarantees	10,500	6,351	—	—	—	—	—	—	—	
Bank financing	9,967	8,233	3,987	2,505	2,850	2,285	10,811	9,174	2,000	1,700
Medium term insurance	16,666	13,906	7,156	6,030	805	650	4,896	4,161	4,295	3,436
Discount loans 2/	11,161	13,733	9,760	8,009	3,300	2,145	—	—	—	—
Medium term credit	—	—	—	—	—	—	—	—	3/	1,700
Total 4/	74,442	53,810	23,402	17,181	6,955	5,080	15,707	13,335	3/	6,836

1/ Cooperative Financing Facility.
2/ In 1982, the discount loan program was replaced by the medium-term credit program.
3/ Not available.
4/ May be overstated because of the funding of certain exports under several programs.

Source: Export-Import Bank of the United States.

employment is not otherwise available (when the training facility is beyond normal commuting distance, transportation and subsistence expenses may be paid); (3) job search allowance to cover expenses of looking for work outside of commuting range (workers may be paid 90 percent of their necessary transportation and subsistence costs up to a maximum of $600); (4) relocation allowance to help workers move their families and household goods to their new area of employment, plus a lump-sum payment not to exceed $600 to help them get settled (workers may be paid 90 percent of their moving expenses); and (5) trade readjustment allowances, generally at the level of unemployment insurance benefits, that become payable when workers have exhausted their entitlement to unemployment insurance, including extended benefits. The combination of unemployment insurance, extended benefits, Federal supplemental compensation, and TRA cannot exceed 52 times the TRA weekly benefit amount, except that up to 26 additional weeks may be paid to workers in approved training. 1/

During 1980-84, there were no investigations conducted by the U.S. Department of Labor in response to petitions by workers for trade adjustment assistance. 2/ However, eight cases were filed in the summer of 1985 by workers at three general aviation producers. If these cases are certified, assistance could be provided to over 5,000 workers. 3/

The Trade Adjustment Assistance Program also authorizes financial assistance for certified firms in the form of direct and guaranteed loans. This program is administered by the Department of Commerce. In addition to the financial assistance, this program provides technical assistance to firms, including: (1) guidance and preparation of certification petitions; (2) general diagnosis of a firm's problems and its opportunities for recovery; (3) assistance in preparing loan applications and adjustment proposals; (4) examination of specific problems recognized by a firm's management; and (5) indepth assistance to firms in carrying out their adjustment proposals. 4/ This program provides technical assistance to a variety of trade-impacted industries to help them deal on an industrywide basis with problems and opportunities concerning marketing, management, export promotion, production operation, and technological innovations. The U.S. Department of Commerce indicates that no commuter or business aircraft producers received assistance during 1980-84.

Government policies viewed by the U.S. industries as hindrances to international competitiveness

There are a number of U.S. Government policies and regulations that the domestic industry perceives as hindering the U.S. commuter and business aircraft industries' international competitiveness. Foremost are general

---

1/ Commission staff interviews with officials of the U.S. Department of Commerce, International Trade Administration, Office of Major Projects.

2/ Commission staff telephone interview with officials of the U.S. Department of Labor, Trade Adjustment Assistance Program.

3/ Ibid.

4/ U.S. Department of Commerce, International Trade Administration, Report on Adjustment Assistance of Calendar Year 1982, Sept. 21, 1983.

economic policies resulting in high interest and dollar exchange rates. They also include more specific policies such as environmental, health, and safety regulations, antitrust laws, and export restrictions.

According to industry sources, the U.S. Department of Labor's Occupational Safety and Health Administration (OSHA) has numerous regulations that affect producers in the areas of worker safety and health, noise, metal fumes and dust, and other emissions. Also, the industry must comply with environmental regulations regarding air and water pollution imposed by the U.S. Environmental Protection Agency (EPA). U.S. companies are also subject to numerous State regulations, which, according to industry officials, may exceed Federal standards. A majority of the U.S. commuter and business aircraft firms that responded to the Commission's questionnaire cited Government safety regulations as adversely affecting the competitive position of the U.S. industry. Only a few respondents complained of the necessity of such regulations or their enforcement. U.S. firms view such requirements as hindering their competitiveness, because many foreign manufacturers do not have to adhere to these types of regulations or bear their associated costs.

Also indicated as adversely affecting U.S. manufacturers are U.S. antitrust laws. The uncertainty caused by their interpretation and application can make collaborative ventures too complicated, time consuming, and expensive. 1/ However, proposals have recently been discussed to remove unwarranted regulatory obstacles to joint ventures between U.S. manufacturers in the research and development area. 2/

The U.S. aircraft industry has also expressed concern that Federal Government export license policies and restraints jeopardize their international competitiveness. Producers complain of initial delays and regulatory impediments that discourage even application for export licenses. Antiboycott and foreign policy export controls make this process even more cumbersome and complicated. The general aviation industry notes the importance of export controls to restrict the shipment of strategic goods and technology but strongly questions the time delay and high cost of the process. The Export Administration Amendments Act, passed July 12, 1985, is proposed to improve U.S. competitiveness by both removing the necessity of export licenses for certain countries and decreasing the license-processing period. 3/

Foreign Government Involvement

Since World War II, foreign governments have been very involved in their aerospace industries. In the general aviation industry, however, there was little foreign competition until the late 1970's. Currently, there are approximately 18 foreign-based manufacturers that are in direct competition with the U.S. industry. These producers offer almost 30 different commuter

---

1/ U.S. Department of Commerce, A Competitive Assessment of the U.S. Civil Aircraft Industry, March 1984, p. 97.

2/ "Justice Department Would Remove Obstacles To Joint Ventures," Aviation Week & Space Technology, Dec. 3, 1984, p. 149.

3/ Walter Olson, "Export Administration Amendments Act of 1985," Business America, Sept. 2, 1985, p. 2.

aircraft models and different business aircraft. 1/ Additionally, there are two foreign manufacturers involved in cooperative ventures with domestic producers. Many of these industries are either wholly or partially owned by their respective governments. Also, in some countries where the aircraft facilities are not government owned, the government has great influence over the firm's operations. 2/

There are several basic areas of foreign government involvement in commuter and business aircraft manufacturing. In general, such involvement is directed at reducing the very large capital expenditures required to develop an aircraft program. This involvement is primarily in the form of grants, low-interest loans, and loan guarantees for capital expenditures and research and development. Such subsidies lower the barriers to entry in the industry, reduce fixed costs, and increase profitability. Higher profit levels may enable firms to increase research and development efforts, invest in state-of-the-art technology, and thus increase efficiency. In addition, many government equity investments are often at better terms than would occur in the private sector. All of this assistance may have increased the total supply of aircraft in the world market over the number of aircraft that would have been supplied by the private sector alone, effectively reducing the world price of aircraft. Other forms of government involvement include preferential procurement policies and favorable export financing.

Foreign governments' public investment in aircraft programs is deemed desirable because a commuter or business aircraft industry is a means of earning foreign currency and improving overall industrial development. Appendix F includes a detailed discussion of the individual foreign aircraft-manufacturing countries, and to the extent the data are available, the policies of their respective governments that influence manufacturing and marketing activity. Although specific examples are noted here, the information presented is general in nature, addressing government intervention in total.

Ownership

The vast majority of the foreign firms competing with U.S. commuter and business aircraft manufacturers are either wholly or partially owned by their respective governments. The following tabulation shows the extent of Federal or regional government ownership of these firms during 1980-84.

1/ Data provided by U. S. importers of commuter and business aircraft.
2/ National Academy of Engineering, The Competitive Status of the U.S. Civil Aviation Industry, 1985, p. 54.

Country	Firm	Extent of government ownership
Brazil	Embraer	51 percent.
Canada	Canadair	100 percent.
Canada	deHavilland	None 1/
France	Aerospatiale	100 percent.
France	Dassault	51 percent.
West Germany	Dornier	4 percent by a State government.
Great Britian	Pilatus Britten Norman.	None, privately owned.
Great Britian	British Aerospace	None 2/
Indonesia	P.T. Nurtanio	100 percent.
Israel	Israel Aircraft Industries.	100 percent.
Italy	Aeritalia	100 percent.
Italy	Partenavia	None, but a wholly owned subsidiary of a 100 percent Government owned firm.
Italy	Piaggio	None, privately owned.
Japan	Mitsubishi Aircraft International.	None, privately owned.
Netherlands	Fokker	None, privately owned.
Northern Ireland	Short Brothers	100 percent.
Northern Ireland	Lear Avia 3/	59 percent.
Spain	CASA	71 percent.

1/ Dehavilland was purchased by Boeing Corp. in December 1985 from the Canadian Government. Prior to this date the firm was 100 percent owned by the Government of Canada.

2/ British Aerospace was 49.3 percent owned by the British Government prior to April 1985.

3/ This firm is currently in bankruptcy proceedings.

With government ownership of production facilities comes the associated benefits of having the necessary funds for capital improvements. One example of this is the Government of Indonesia, which reportedly provided the funds to build Nurtanio's production facilities at an estimated cost of $175 million. 1/ Both Indonesia and Brazil have recently installed some of the world's most advanced machine tools in their manufacturing establishments with funds provided by their Governments.

Procurement

Since many of the foreign manufacturers of commuter and business aircraft are the sole general aviation producer in their countries, their governments generally purchase applicable aircraft from these firms. Being the only

1/ James Bauchspies and William Simpson, ORI, "Government Participation In Foreign Aeronautical Industries," Research and Technology Perspectives For General Aviation and Commuter Aircraft, September 1982, pp. 6-24.

producer available for government purchases can add an element of stability to a production run. Military purchases by CASA of Spain and Nurtanio of Indonesia have proved very significant for the C212 and the CN 235. The Canadian, British, and Brazilian Governments have also been important customers for their respective commuter and business aircraft producers. Additional data regarding individual countries' procurement of commuter and business airplanes by Federal entities are contained in appendix F.

Research and development

As noted earlier in this report, a continuous program of research and development is necessary for success in both commuter and business aircraft manufacturing. Government-owned producers are often able to continue research products regardless of market sales owing to the infusion of federal funds. Loan guarantees are also offered, allowing manufacturers to obtain commercial financing for their research ventures at reduced rates because of the absorption of risk by the government.

Some of the foreign manufacturers have close ties to their national research agencies. The following tabulation shows some of these organizations.

Country	Research Organization
Japan	National Aeronautical Laboratory, National Research Institute.
West Germany	Dt Forschurges - v Versuchanstalts uft - v Ravnfiahrt, Ministary of Research & Technology.
France	National Office of Aerospace Research.
Brazil	Aeronautics Technical Center, Instituto Technologico de Aaronautica.
Great Britian/Northern Ireland	Royal Aircraft Establishment, Department of Trade and Industry.
Netherlands	Netherlands Agency for Aerospace Programs.
Spain	Instituto Nacional de Industria.

Public expenditures for civil aeronautics research at some of these facility are shown below (in millions of dollars). 1/

1/ Data provided by Gerald Bernstein, Aviation Consultant, SRI International, and European Economic Community, European Aerospace Industry, 1984, p. 114. More recent data are not available.

Country	1980	1982
France	167	1/
Germany	151	168
Great Britain/Northern Ireland	161	157
Italy	12	29
Netherlands	–	1/

1/ Not available.

Even with these figures, the extent of assistance provided by these research agencies is unclear. In general, however, the studies they conduct are more product specific rather than focused on general aeronautics. Other foreign manufacturers may have national research centers that, although multiproduct oriented, offer some assistance. Additionally, research that has application for commuter and business aircraft is sometimes carried out through the defense-related departments. Numerous examples of research and development assistance provided by foreign governments, especially Canada, Indonesia, Brazil, and France are discussed in the individual country sections of appendix F.

Production and financial assistance

Government-owned firms, or those industry sectors targeted for development, receive both direct and indirect assistance. Direct assistance often takes the form of production loans, or actual grants. Central government financing during the launch phase of commuter and business aircraft is common. Capital infusions during this period are extremely important, as the inherent risks involved can determine the future success of a manufacturer. Financial assistance is also provided for production of commuter and business aircraft. This allows foreign manufacturers to go forth with production without being forced to rely on acquiring capital from commercial sources at market rates. One of the most prominent examples of this is the Canadian Challenger 600/601 business aircraft, for which the Canadian Government provided Can$38.6 million in 1982 and and Can$6.2 million in 1983. Fokker received nonrepayable Government funding of $20 million for development of the F-28 and has also received loan guarantees and flexible term repayable loans totaling $250 million for the F-50 and F-100. 1/ In February 1986 it was announced that Fokker will receive an additional $36.8 million from the Dutch Government. 2/ Aerospatiate of France is also a large recipient of Government aid. Assistance for the ATR 42 commuter airplane totaled $134.6 million during 1981-84. 3/ In 1985, an additional $11.1 million has been alloted for this aircraft. Data regarding aid for the Falcon 900 business airplane are not

1/ Data provided by Gerald Bernstern Aviation consultant, SRI International.
2/ "News Digest," Aviation Week & Space Technology, Feb. 10, 1986, p. 34.
3/ Data provided by Jeff Jackson, U.S. Department of Commerce, Office of Aerospace.

available for 1980-83. There were no expenditures in 1984, and $21.5 million was alloted for 1985. 1/

Government production assistance also allows continuation of aircraft lines when market forces would not. One example of a government investment sustaining production was the Australian Nomad commuter aircraft. Before production ceased in 1982 only 180 planes had been sold in 18 years. Massive government subsidies were responsible for the extended production period. 2/

Indirectly, government grants and loans provided for other commercial or military products also have spillover effects into the production of commuter or business aircraft. The upgrading or expansion of facilities these funds allow benefit all of the products manufactured. A recent example of this involves a Spanish firm. This company, CASA, received a $22 million interest-free loan from the Government of Spain to finance its participation in Airbus Industrie. 3/ Portions of these funds could potentially benefit the firm's commuter aircraft operations. Aerospatiale and British Aerospace, with large capital infusions to fund their participation in Airbus Industrie, are also likely to benefit in the area of general aviation products.

Tax incentive programs have also been used to finance foreign commuter and business aircraft development. Companies are sometimes exempted from paying taxes or duties on raw materials and subcomponents used in airplane manufacture. More inventive tax schemes have also been used to fund firms during 1980-84. In Brazil, for example, Brazilian corporations could invest up to 1 percent of their Federal tax liability on Embraer shares during the initial stages of the company's development. 4/

Export promotion and financing

Export promotion is another area of foreign government involvement aimed at increasing industry sales. Promotion may simply take the form of market research through embassies in foreign markets or representation of the industry at trade shows. However, several governments have reportedly offered inducements that only central governments could provide for export sales. Incidents of the granting of foreign aid or export licenses in unrelated commodities, as well as offset and countertrade offers, have occurred. Although, public documentation of these arrangements are not available, private discussions with both government and industry officials indicate that these practices do occur.

With regard to financing of aircraft sales in the United States or in third-country markets, foreign government support most often takes the form of medium- and long-term loans at interest rates specified in the general OECD

1/ Government of France, Budget Vote de 1985-Transport II-Aviation Civile, 1985, pp. 109-111.

2/ National Academy of Engineering, The Competitive Status of the U.S. Civil Aviation Manufacturing Industry, 1985, p. 88.

3/ Data provided by Jeff Jackson, U.S. Department of Commerce, Office of Aerospace.

4/ Richard W. Moxon, Thomas W. Roehl, and J. Frederick Truitt, University of Washington, Emerging Sources of Foreign Competition in the Commercial Aircraft Manufacturing Industry, June 1985.

Arrangement on Guidelines for Official Export Credits. These loans and loan guarantees are provided by the national banks of the respective aircraft producing nations. For loans, the financing terms are typically 65 to 85 percent cover with rates and repayment schedules consistent with internationally prescribed standards. This agreement, however, does allow nations to subsidize their exports through the extension of officially supported export financing.

However, there have been numerous examples of government-supported financing of commuter and business aircraft at rates below those normally offered. Preferential financing arrangements offered by some foreign export agencies also include no or minimal downpayment, below-market interest rates, lengthly loan terms, and deferral of interest or principal payments for several years. 1/ Brazil is one of the countries that has offered Government-sponsored financing at below-market rates during 1980-84. Countries with severe foreign-exchange shortages frequently also will offer extraordinary financing terms for aircraft in order to gain foreign currency. Industry analysts note that this may be another rationale for Brazil's granting of generous terms. 2/ Foreign export credits have the effect of reducing the initial cost of acquiring commuter and business aircraft and reducing their operating costs. These credits can also offset price concession or increases in fuel efficiency. A Commission study done in 1982 noted that a 1-percent difference in interest rates due to foreign export credits can offset as much as a 3-percent advantage in price or a 2-percent improvement in fuel efficiency. 3/

In addition to the provision of financing for aircraft exports, foreign producers are frequently able to offer purchasers a wide range of support and guarantee programs including credit risk insurance, mixed credits, and local cost supports. 4/ Although the latter programs are more pronounced in the sale of large transports, industry sources note that they are beginning to occur in general aviation.

Another important financing method involves leasing. U.S. Government sources note that the OECD guidelines on financing do not specifically address leasing. Leasing has recently become the preferred method of financing for new equipment in the commuter airline industry and has allegedly been used by some foreign manufacturers to gain an advantage in the market. Industry sources note that instances of undervalued leases and periods of use without renumeration to the producer have been alleged to have occurred in the general aviation industry. Public data, however, are not available to substantiate these claims.

1/ National Academy of Engineering, The Competitive Status of the U.S. Civil Aviation Manufacturing Industry, 1985, p. 88.

2/ U.S. General Accounting Office, Emerging Issues In Export Competition: A Case Study of the Brazilian Market, Sept. 26, 1985, p. 39.

3/ U.S. International Trade Commission, Impact of Foreign Export Credit Subsidies on the U.S. Commuter Aircraft Industry, November 1982.

4/ U.S. General Accounting Office, op. cit.

Hindrances

Little public data are available regarding foreign government policies that hinder their commuter and business aircraft manufacturers. However, producers in many developed countries, especially in Europe and Canada, indicated that they must bear the costs of industrial regulation in the areas of environmental protection and health and safety concerns.

Competitive Position of U.S. and Foreign Commuter and Business Aircraft Producers

Structural factors of competition

Commuter aircraft.--In terms of competitive advantage in the production of commuter aircraft, U.S. producers, in response to Commission questionnaires, compared themselves with competitors in Canada, Brazil, Great Britian, Spain, France, Northern Ireland, the Netherlands, West Germany, Sweden, and Indonesia (table 26). In general, domestic manufacturers indicated that they have the same competitive position with these countries with respect to the availability of fuel, raw materials, and labor, the cost of raw materials, the skill level of labor, and production technology. The cost of fuel was the one area that domestic producers felt that they had a clear advantage over most foreign producers. In contrast, they judged Brazil, Spain, France, and Indonesia to benefit from lower labor costs. Foreign competitors are believed to also have a strong advantage in the cost and availability of capital and in assistance from the respective governments. Government involvement in the forms of actual production grants and export financing were noted with regard to Canada, Brazil, Great Britain, Spain, France, West Germany, and Indonesia. The Netherlands and Sweden were indicated to benefit only from export financing assistance. Tariff protection, nontariff barriers, and domestic regulations that increase costs of importation into home markets were stated to exist in both Brazil and Indonesia.

Compilation of questionnaire data from U.S. importers of commuter aircraft noted fairly similar results. Domestic and foreign industries were judged equally competitive in raw material availability, the cost of raw materials, the skill level of labor and production technology, but also in fuel costs, which U.S. producers had indicated were in their favor (table 27). Importers also noted that all of their international competitors, except Canada, West Germany, and Sweden, had a competitive advantage in labor costs. With regard to government involvement, the vast majority of U.S. importers indicated that producers in Canada, Brazil, Great Britain, France, Northern Ireland, the Netherlands, and Indonesia, have a competitive advantage over domestic producers in the U.S. market.

Business aircraft.--U.S. producers of business aircraft indicated that both domestic and foreign manufacturers generally enjoy a comparable position in terms of fuel, raw materials, and labor availability, the cost of fuel and raw materials, the skill level of workers, and production technology (table 28). The U.S. industry was compared with producers in Canada, France, Great Britain, Japan, Israel, Brazil, Sweden, Spain, and Italy. These foreign manufacturers were noted as having the competitive advantage in capital availability and cost, government subsidies, and export financing. Similar conclusions were drawn with regard to foreign markets. Government restrictions

Table 26.--Commuter aircraft: U.S. producers' competitive assessment of structural factors of competition for the U.S. industry and selected foreign industries, by major competing countries, 1980-85 1/

Item	Canada	Brazil	Great Britain	Spain	France	Northern Ireland	Netherlands	West Germany	Sweden	Indonesia
Fuel:										
Availability	S	S	S	S	S	S	S	S	D	S
Cost	S	D	D	D	D	D	D	D	D	D
Raw materials:										
Availability	S	S	S	D	S	D	S	S	S	D
Cost	S	S	S	S	S	S	S	S	S	D
Capital:										
Availability	F	F	F	S	F	F	S	S	S	F
Cost	F	F	F	F	F	F	S	S	S	F
Ability of industry profits to attract funds	S	F	S	S	S	S	S	S	F	S
Labor:										
Availability	S	S	S	S	S	S	S	S	S	D
Cost	S	F	S	F	F	F	S	S	S	F
Skill level	D	D	S	D	S	S	S	S	S	D
Production technology	S	S	S	D	S	S	S	S	S	D
Government involvement:										
Subsidies	F	F	F	F	F	F	S	F	S	F
Export financing	F	F	F	F	F	F	F	F	F	F
Research and development assistance	F	F	S	S	S	S	S	S	S	F
Tariff protection	S	F	S	S	S	S	S	S	S	F
Nontariff barriers to imports	S	F	S	S	S	S	S	S	S	F
Domestic regulations which increase costs	S	F	S	S	S	S	S	S	S	F

1/ D = domestic advantage; F = foreign advantage; and S = competitive position the same.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table 27.—Commuter aircraft: U.S. importers' competitive assessment of structural factors of competition for the U.S. industry and selected foreign industries, by major competing countries, 1980-85 1/

Item	Canada	Brazil	Great Britain	Spain	France	North Ireland	Netherlands	West Germany	Sweden	Indonesia
Fuel:										
Availability	S	S	S	D	S	S	S	S	D	D
Cost	S	D	D	D	D	D	D	D	D	D
Raw materials:										
Availability	S	S	S	D	S	D	S	S	D	D
Cost	S	S	S	S	S	S	S	S	S	D
Capital:										
Availability	D	D	D	S	S	D	S	S	D	D
Cost	S	D	D	D	S	S	S	S	S	S
Ability of industry profits to attract funds	D	F	S	D	D	D	D	S	S	D
Labor:										
Availability	S	F	S	F	S	F	S	S	S	D
Cost	S	F	F	F	F	F	F	S	S	F
Skill level	S	S	S	D	S	S	S	S	S	D
Production technology	S	S	D	D	S	D	S	S	S	D
Government involvement:										
Subsidies	F	F	F	F	F	F	F	S	S	F
Export financing	F	F	F	F	F	F	F	S	F	F
Research and development assistance	S	S	F	F	S	F	S	S	S	F
Tariff protection	S	F	S	S	S	S	S	S	S	F
Nontariff barriers to imports	S	F	S	S	S	S	S	S	S	F
Domestic regulations which increase costs	S	F	S	S	S	S	S	S	S	F

1/ D = domestic advantage; F = foreign advantage; and S = competitive position the same.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

82

Table 28.—Business aircraft: U.S. producers' competitive assessment of structural factors of competition for the U.S. industry and selected foreign industries, by major competing countries, 1980–85 1/

Item	Canada	France	Great Britain	Japan	Israel	Brazil	Sweden	Spain	Italy
Fuel:									
Availability	S	S	S	D	S	S	D	S	S
Cost	S	S	S	D	D	S	D	D	S
Raw materials:									
Availability	S	S	S	D	D	S	S	D	D
Cost	S	S	S	D	D	S	S	D	D
Capital:									
Availability	S	F	F	F	F	F	S	S	S
Cost	F	F	F	F	F	F	S	F	S
Ability of industry profits to attract funds	S	S	S	F	S	F	S	S	S
Labor:									
Availability	S	S	S	S	S	S	S	S	S
Cost	S	S	S	F	F	F	S	F	F
Skill level	S	S	S	D	D	D	S	D	D
Production technology	S	S	S	S	D	S	S	D	S
Government involvement:									
Subsidies	F	F	F	F	F	F	S	F	S
Export financing	F	F	F	F	F	F	F	F	F
Research and development assistance	F	S	S	F	S	F	S	S	S
Tariff protection	S	S	S	S	S	F	S	S	S
Nontariff barriers to imports	S	S	S	F	S	F	S	S	S
Domestic regulations which increase costs	S	S	S	S	S	F	S	S	S

1/ D = domestic advantage; F = foreign advantage; and S = competitive position the same.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

83

Table 29.—Business aircraft: U.S. importers' competitive assessment of structural factors of competition for the U.S. industry and selected foreign industries, by major competing countries, 1980-85 1/

Item	Canada	France	Great Britain	Japan	Israel	Brazil	Sweden	Spain	Italy
Fuel:									
Availability	S	S	S	D	D	S	S	D	S
Cost	S	D	D	D	D	D	D	D	D
Raw materials:									
Availability	S	S	S	S	D	S	D	D	D
Cost	S	S	S	D	D	S	D	S	D
Capital:									
Availability	D	D	D	F	D	D	D	D	D
Cost	D	S	D	F	D	S	S	D	D
Ability of industry profits to attract funds	D	S	S	S	D	D	D	D	D
Labor:									
Availability	S	S	S	S	D	S	S	S	S
Cost	S	D	D	D	F	D	S	F	S
Skill level	S	D	D	D	D	D	S	D	D
Production technology	D	S	D	D	D	D	S	D	D
Government involvement:									
Subsidies	F	F	S	F	F	F	S	F	F
Export financing	F	F	F	F	F	F	F	F	F
Research and development assistance	S	S	S	F	F	F	S	F	F
Tariff protection	S	S	S	S	F	F	S	S	S
Nontariff barriers to imports	S	S	S	F	F	F	S	S	S
Domestic regulations which increase costs	S	S	S	S	F	F	S	F	F

1/ D = domestic advantage; F = foreign advantage; and S = competitive position the same.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

84

on imports into their home markets through tariff or nontariff measures were indicated by domestic producers to exist only in Japan and Brazil.

In response to Commission questionnaires, importers of business aircraft indicated that U.S. manufacturers have the competitive advantage in the cost of fuel, the availability of capital, the ability of the industry to attract funds, the skill level of employees, and in production technology (table 29). These importers also noted difficulty in selling business aircraft in Israel, as well as Japan and Brazil.

Product-related factors

Commuter aircraft.--In response to the Commission's questionnaire, U.S. producers of commuter aircraft indicated that neither domestically produced products nor imports have a clear competitive advantage in the U.S. market (table 30). The one area where domestic manufacturers noted that they have a slight competitive advantage is in historical supplier relationships. Foreign products, with the exception of those from West Germany and Sweden, were indicated to have a significant competitive advantage in being able to provide favorable financing to purchasers of their commuter aircraft. Brazil and Northern Ireland were also judged to have the advantage over the United States manufacturers in the area of price. Similar results were indicated with regard to foreign markets.

U.S. importers, in their response to the Commission's questionnaire, did not indicate any product-related factors in which the United States has a significant competitive advantage (table 31). In all areas except financing, the general consensus was that domestic and foreign producers were equally competitive. The ability to provide favorable financing was noted to be an important advantage for manufacturers in Canada, Brazil, Great Britain, Spain, France, and Northern Ireland.

Business aircraft.--The Commission's survey of U.S. producers of business aircraft indicated that domestic manufacturers have a competitive advantage in product performance features such as superior design, more durable technology, less required maintenance, and greater energy efficiency (table 32). In almost all other product-related areas, U.S. manufacturers noted that they were equally competitive with producers in Canada, France, Great Britain, Japan, Israel, Brazil, Sweden, Spain, and Italy. In the area of favorable financing, all of the foreign competitors were judged to have a significant competitive advantage over their U.S. counterparts.

In contrast, U.S. importers considered most imported business aircraft fully competitive with U.S. products in most respects (table 33). Although insufficient data were available to make a judgment regarding Sweden, Spain, and Italy, other importers noted that the only area that U.S. producers have a competitive advantage was in the area of historical supplier relationships. They reported that Canada and Brazil offer their products in the U.S. market at a lowered delivered cost, with Brazil offering more favorable financing.

Table 30.—Commuter aircraft: U.S. producers' competitive assessment of product-related factors of competition for U.S.-produced and foreign-made planes in the U.S. market, by major sources, 1980-85 1/

Item	Canada	Brazil	Great Britain	Spain	France	North Ireland	Netherlands	West Germany	Sweden	Indonesia
Lower purchase price (delivered)	S	F	S	S	2/	F	S	S	2/	2/
Shorter deliver time	S	S	S	S	S	F	S	F	S	S
Availability	S	S	S	S	S	F	S	F	S	S
Servicing/training	S	S	S	D	S	S	S	D	S	D
Favorable financing	F	F	F	F	F	F	F	S	S	F
Favorable warranties	S	S	S	S	2/	S	S	S	S	S
Historical supplier relationship	D	D	S	D	D	S	S	D	S	D
Availability of spare parts	S	S	S	D	2/	S	S	D	S	D
Compatability with existing system	S	S	S	S	2/	S	S	D	2/	2/
Product performance features:										
Superior design	S	D	S	D	S	D	S	D	S	S
More durable technology	S	S	S	D	S	S	S	D	S	S
Less maintenance	S	S	S	D	S	F	S	S	S	D
More energy efficient	S	S	S	D	S	D	S	D	S	S

1/ D = domestic advantage; F = foreign advantage; and S = competitive position the same.
2/ Insufficient data.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table 31.—Commuter aircraft: U.S. importers' competitive assessment of product-related factors of competition for U.S.-produced and foreign-made planes, in the U.S. market, by major sources, 1980-85 1/

Item	Canada	Brazil	Great Britain	Spain	France	Northern Ireland	Netherlands	West Germany	Sweden	Indonesia
Lower purchase price (delivered)	S	F	S	F	S	F	S	S	S	F
Shorter delivery time	S	S	S	S	D	F	S	D	S	D
Availability	S	S	S	S	S	F	S	S	S	S
Servicing/training	S	S	S	D	S	S	S	D	D	D
Favorable financing	F	F	F	F	F	F	S	S	S	2/
Favorable warranties	S	S	S	S	S	S	S	S	S	S
Historical supplier relationship	S	D	S	D	D	S	S	D	S	D
Availability of spare parts	S	S	S	D	D	S	S	D	D	D
Compatability with existing systems	S	S	S	2/	S	S	S	2/	S	2/
Product performance features:										
Superior design	S	S	S	D	S	D	S	S	S	D
More durable technology	S	S	S	D	S	F	S	S	S	D
Less maintenance	S	S	S	S	S	F	F	D	S	D
More energy efficiency	S	S	S	D	S	D	S	S	S	D

1/ D = domestic advantage; F = foreign advantage; and S = competitive position the same.
2/ Insufficient data.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

87

Table 32.—Business aircraft: U.S. producers' competitive assessment of product related factors of competition for U.S.-produced and foreign-made planes in the U.S. market, by major sources, 1980-85 1/

Item	Canada	France	Great Britain	Japan	Israel	Brazil	Sweden	Spain	Italy
Lower purchase price (delivered)	F	S	S	F	F	S	S	S	S
Shorter delivery time	S	S	S	S	S	S	S	D	S
Availability	S	S	S	S	S	S	S	S	S
Servicing/training	S	S	D	S	S	S	S	D	D
Favorable financing	F	F	F	F	F	F	S	F	S
Favorable warranties	S	S	S	S	S	S	S	S	S
Historical supplier relationship	S	D	D	D	D	D	D	D	D
Availability of spare parts	S	S	S	S	D	S	D	D	D
Compatability with existing system	S	2/	S	2/	D	S	2/	D	D
Product performance features:									
Superior design	D	D	D	D	D	D	S	D	D
Major durable technology	S	D	D	D	S	D	D	D	D
Less maintenance	S	S	D	D	S	D	D	D	D
More energy efficient	S	D	D	D	D	D	D	D	D

1/ D = domestic advantage; F = foreign advantage; and S = competitive position the same.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

88

Raw materials, labor, and capital

Both U.S. and foreign manufacturers are normally able to obtain all necessary components for the manufacture of commuter and/or business aircraft at competitive prices. Therefore, neither can be judged to possess a significant competitive advantage in this area. The availability of labor is another factor where foreign and domestic producers are basically equally competitive. However, State-owned aircraft manufacturers may have the advantage of preferential access to components and skilled labor. Because of the public importance of an aircraft industry, governments may, at times, become involved in the allocation of scarce resources. This could give favored producers an advantage over those dependent on market forces.

Regarding the cost of labor, foreign competitors may enjoy a small advantage in this area. Industry analysts note that wages paid in the U.S. commuter and business aircraft industries are somwehat higher than those in foreign countries. However, when productivity is considered, it is doubtful that non-U.S. manufacturers have a clear advantage. 1/

The availability and cost of capital are two important areas where U.S. producers of commuter and business aircraft are often at a competitive disadvantage compared with their foreign counterparts. In most government-owned firms, capital is available from public funds. Grants for special projects may be underwritten by various civil or military government agencies. Low-interest loans are also frequently provided by the State. Specific instances of these government-sponsored equity infusions are discussed in appendix F. These capital requirements combine to significantly lower the capital requirements of a large number of foreign manufacturers. American firms, in contrast, must depend on commerical markets for their funds.

Quality/technology

Largely because of the significant extent of U.S. quality and safety regulation in these industries, U.S.-manufactured commuter and business aircraft are equal to foreign-built products in quality and performance. Commuter airlines note that early in the production history of commuter aircraft, the domestic products were basically derivations of corporate aircraft and not totally suited for commuter use, but many foreign airplanes were adaptations of military planes and were more rugged. This, however, has changed considerably in the last 5 years with the emergence of aircraft specifically designed for commuter airline use. Because the U.S. industry has a long and celebrated history in the manufacture of business aircraft, problems like this did not exist in this area.

Involved with the quality of the final product are the equipment and techniques applied in the manufacture of the plane. In this competitive area, several foreign manufacturers have an advantage over U.S. producers. Some foreign manufacturers have installed highly advanced machine tools, and others have succeeded in significantly mechanizing their production processes. The

1/ U.S. Department of Commerce, A Competitive Assessment of the U.S. Civil Aircraft Industry, March 1984.

Table 33.—Business aircraft: U.S. importers' competitive assessment of product-related factors of competition for U.S.-produced and foreign-made planes in the U.S. market, by major sources, 1980-85 1/

Item	Canada	France	Great Britain	Japan	Israel	Brazil	Sweden	Spain	Italy
Lower purchase price (delivered)	F	S	S	S	S	F	2/	2/	2/
Shorter delivery time	S	S	D	D	S	S	2/	2/	2/
Availability	S	S	D	S	D	S	2/	2/	2/
Servicing/training	S	S	S	S	D	D	2/	2/	2/
Favorable financing	S	S	S	S	S	F	2/	2/	2/
Favorable warranties	S	S	S	S	S	S	2/	2/	2/
Historical supplier relationship	D	D	D	D	D	D	2/	2/	2/
Availability of spare parts	D	D	S	S	D	S	2/	2/	2/
Compatability with existing systems	D	S	2/	2/	2/	D	2/	2/	2/
Product performance features:									
Superior design	D	S	S	S	S	S	2/	2/	2/
More durable technology	S	S	S	S	S	S	2/	2/	2/
Less maintenance	D	S	S	S	S	S	2/	2/	2/
More energy efficiency	D	S	S	S	S	S	2/	2/	2/

1/ D = domestic advantage; F = foreign advantage; and S = competitive position the same.
2/ Insufficient data.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

90

following tabulation gives a comparison of capital expenditures as a percentage of sales for the U.S. commuter and business aircraft industries and those of several foreign competitors (in percent). 1/

Year	United States	Netherlands	Spain	Sweden	West Germany
1980	1/	1/	5.4	1/	1/
1981	3.8	4.6	8.4	16.0	1/
1982	4.7	5.0	6.4	16.1	2.2
1983	5.3	1.8	5.6	11.6	1.4
1984	12.7	3.2	10.3	9.6	1/

1/ Not available.

In general, U.S. expenditures were comparable with those of foreign firms. Sweden's expenditures were higher, reflecting the construction of the facility that allowed them to begin production of commuter and business planes. Prior to 1983, most of the capital investments made by foreign producers consisted of manufacturing capacity expansion. Since then, however, significant improvements have been made in modernizing both production processes and facilities. For the most part, U.S. producers of commuter and business aircraft still employ older machinery and more labor-intensive manufacturing methods.

Technology encompasses both the research and development of new technology, as well as its incorporation in new and existing products. In the commuter aircraft market, only one domestic manufacturer is involved in the "new-generation" aircraft area, in a partnership venture with a Swedish producer. Although research is continuing to improve existing U.S.-built commuter airplanes, a large part of the new technology market is devoid of U.S. products. U.S. manufacturers assert, however, that one of the primary reasons for the lack of U.S. involvement in this market is the large extent of foreign government assistance provided to many of their competitors. Government-owned firms, U.S. sources note, are frequently able to undertake more speculative ventures than can publicly owned firms, because capital is provided by the State.

In the business aircraft market, however, U.S. producers are at the forefront of new technology applications. Extensive work in new aircraft configurations, as well as in composite structures, is being performed in domestic facilities. U.S. business airplane producers, however, also note the benefits many of their foreign competitors have in the technology area because they are government owned.

The United States, even with the limited direct involvement of NASA in general aviation, does have a competitive advantage in technology research. The extensive research facilities and expertise incorporated in this U.S. Government agency can provide assistance and advice for domestic manufacturers. Basic aeronautical research done at NASA can also stimulate new technology that has potential benefits to commuter and business aircraft.

1/ Derived from data presented in app. F.

It is true that most NASA research results are available to the majority of foreign producers. U.S. producers, however, are normally involved with many NASA programs and are aware of research conclusions before public dissemination of the results. Although several foreign manufacturers do have national aeronautical research centers, none are believed to be as technologically advanced or have has as extensive facilities as NASA.

Another important factor to note in any analysis of technological competitiveness is technology transfer from military to civilian products. The importance of this spillover is extremely difficult, if not impossible, to evaluate. However, there has been some transfer in the commuter aircraft area. Initially, a number of foreign-built commuter planes were adaptions of military aircraft. The rugged nature of these planes made them very suitable for commuter operations. Industry sources agree, that, in general, foreign producers have a competitive advantage over their U.S. counterparts in this area.

Marketing

In general, the marketing process is the same whether a domestic or foreign manufacturer is attempting to sell an airplane. However, although the marketing approach may be the same, the offers can differ significantly. Foreign manufacturers may be able to offer more generous financing terms or price discounts. Industry sources note that these items (discussed later in this competitiveness section) are extremely important marketing factors and provide salesmen of foreign-built aircraft an important competitive edge.

In an attempt to offset partially foreign firms' competitive advantage in this area, some U.S. manufacturers have offered innovative marketing schemes involving equipment guarantees. Cessna Aircraft Co. announced a market campaign called the "Cessna Challenge," under which the firm will guarantee turboprop owners reduced operating costs per mile with the jet-powered Citation S/II aircraft, or the firm will reimburse owners for the difference. This guarantee applies to aircraft purchased before yearend 1985. 1/ Company sources indicate that the purpose of the program is to correct the misconception that turboprop airplanes operate at lower costs per mile than jets. Beech Aircraft Corp. is offering another guarantee program. This firm is offering a longer than usual warranty on the wing life of their King Air series business aircraft. Additionally, an insurance program arranged by the firm can provide 20 percent savings on hull and liability insurance costs. 2/ Industry sources state that this campaign is also an attempt to stimulate sales and create an economic environment conducive to the purchase of business aircraft through improved performance and equipment guarantees.

Another marketing advantage that government-owned manufacturers are alleged to have involves the use of political pressure. Industry sources note that in markets outside the United States, especially where the purchaser is a State-owned airline or the government is making the decision, marketing

1/ Aviation Equipment Maintenance, May 1985, p. 65.
2/ "1983 Corporate Aircraft Roundup," Dunns Business Month, August 1983, p. 80.

assistance by foreign Federal officials or other political manuevers are sometimes used to influence equipment acquisition decisions. Additionally, the firm's home government can offer potential purchasers benefits from non-aircraft-related industries, or foreign aid to induce purchase of a particular plane. It is true that this marketing problem is more pronounced in large transport than in commuter and business aircraft, but U.S. manufacturers assert that they have encountered several sales campaigns where sales were lost due to political pressure from State-owned manufacturers.

Price considerations

Purchasers of both commuter and business aircraft have consistently stated that an important factor in their selection of an airplane is price. The price of an aircraft generally includes the training of pilots and maintenance personnel, typically two pilots and one or two mechanics. 1/

Purchasers of commuter aircraft will typically evaluate competing aircraft prices on the basis of the cost per seat. These values are shown in the following tabulation for several different airplane models: 2/

Aircraft	Producer	Country of origin	Price per seat
C-212	CASA	Spain	$94,231
Twin otter	deHavilland	Canada	94,737
228-200	Dornier	West Germany	99,895
Bandeirante	Embraer	Brazil	102,263
Shorts 330	Short Brothers	N. Ireland	111,833
Shorts 360	do	do	122,222
C99	Beech	United States	124,613
HS-748	British Aerospace	Great Britain	125,000
F-27	Fokker	Netherlands	130,000
1900	Beech	United States	149,578
Brasilia	Embraer	Brazil	157,200
Jetstream 31	British Aerospace	Great Britain	158,333
Dash 7	deHavilland	Canada	160,000
SF-340	Saab/Fairchild	Sweden/United States.	160,000
Dash 8	deHavilland	Canada	166,667

Business aircraft purchasers do not generally consider per seat costs in their decision, since the aircraft is not a revenue-generating piece of capital equipment as in the case of commuter airlines. U.S. producers of commuter and business aircraft, however, assert that foreign producers have the ability to price their equipment at or below competing U.S. aircraft prices. These manufacturers insist that performance capabilities are not as important in the typical short-haul routes, and therefore price and operating cost often dominate the purchasing decision. Foreign producers are alleged to enjoy an advantage in labor costs and government assistance for aircraft development

1/ Spare parts for individual aircraft purchases are not a significant factor, as they account for less than 1 percent of the aircraft price.

2/ Data provided by Beech Aircraft Corp.

and financing, allowing them to underprice U.S. manufacturers. 1/ Also, such factors as higher capital costs and product liability insurance are cited by U.S. manufacturers as being partly responsible for their higher prices.

In recent years, product liability has increasingly been noted by domestic general aviation producers as one of the key reasons for their higher aircraft costs. In 1985, product liability premiums for general aviation aircraft totaled nearly $135 million. 2/ Estimates vary, but industry sources assert that in the United States, these costs alone account for between 10 and 30 percent of the cost of an airplane. By comparison, in 1962, the average cost of product liability insurance for a manufacturer was less than 1 percent of the aircraft's selling price, and in 1975, these costs amounted to just over 5 percent. 3/

Although the cost of product liability associated with general aviation aircraft has been a factor in the selling price of planes during the last 5 years, much of the reason for the recent increase in overall aircraft program costs lies in the fact that insurance premiums for virtually all general aviation manufacturers have risen by at least 100 percent in the last year alone. In addition to the price of insurance, the time and cost of company personnel to handle the numerous litigations filed has affected domestic firms' overall cost structure. 4/ Piper Aircraft Corp. indicated that it employs 20 full-time employees simply to gather documents necessary for litigations. Also, the companies must establish reserves for losses (retentions), or self-insurance policies, which now run into the tens of millions of dollars per company. 5/

The vast majority of the suits filed against U.S. manufacturers involve products not covered by this study, namely, small, recreational-use planes. Much of the litigation centers around airplanes that are, on average, 10 years old. Manufacturers state, however, that they are at risk for suits on the 210,000 aircraft in the U.S. general aviation fleet, some of which were built even 50 years ago. 6/ Also, domestic manufacturers can be sued in the United States for accidents that occurred in foreign countries in order to gain higher damage awards. 7/

Since the majority of the domestic producers of business and commuter airplanes manufacture all types of aircraft, their increased insurance costs must be spread among all the units sold. Additionally, as the number of private-use aircraft a manufacturer delivers decreases, each unit sold, regardless of type, must absorb a larger portion of the increasing overall

---

1/ U.S. Department of Commerce, International Trade Administration, A Competitive Assessment of the U.S. Civil Aircraft Industry, March 1984, p. 136.

2/ "Our Costly Liability Lottery, Part II," Business and Commercial Aviation, August 1985, p. 11.

3/ J. Jefferson Miller, "Diminishing Returns," AOPA Pilot, April 1985, p. 40.

4/ General Aviation Manufacturers Association, Product Liability Threatens U.S. General Aviation, December 1985.

5/ Speech by Frank M. Adams, president, Aircraft Systems Co., Bendix Aerospace Sector, before the National Aviation Club, Sept. 19, 1985.

6/ "Product Liability Is Key Problem for General Aviation Companies," Aviation Week and Space Technology, May 13, 1985, p. 74.

7/ Douglas J. Besharov and Peter Reuter, "Tort Laws Hobble U.S. Business," The Wall Street Journal, Oct. 28, 1985.

pool of insurance costs and liability risks. Officials of Beech Aircraft state that a much higher amount of their liability costs are apportioned to their turboprop airplanes compared with that for smaller, single-engine models. 1/ This firm estimates that in March 1985, $70,000 was the average cost of product liability for each aircraft shipped. 2/ Piper Aircraft Corp. estimates that product liability adds an average of $60,000 to $70,000 to each aircraft sold. 3/ The burden of product liability was estimated to have increased to $80,000 by February 1986. 4/

In addition to contributing to higher aircraft prices, the issue of product liability has resulted in a withdrawal of products from the marketplace as well as a lack of improvements in existing products. Manufacturers assert that there is some reluctance to make improvements in a product for fear that at some future time they could be held liable for not making that improvement earlier. State-of-the-art technology can, and is being, used to criticize earlier production methods when such technology was not even known to the manufacturer. 5/

Legislation regarding product liability for all products has been proposed. These bills, S.100 in the U.S. Senate and H.R. 2568 in the U.S. House of Representatives, seek to define the responsibilities of the manufacturers and limit their responsibilities for changes in the product. The proposed legislation also limits manufacturers' responsibility to 10 years after the date of production and excludes the user of the product from obtaining damages if the product was misused. S.100 did not receive approval of the Senate Commerce, Science, and Transportation Committee in a vote taken in May 1985. H.R. 2568 is currently before the House Committee on Energy and Commerce for approval. Industry sources indicate that this type of legislation is necessary to help restore U.S. producers' competitiveness in the world market.

Foreign producers of commuter and business aircraft generally do not bear the same type or amount of product liability insurance burdens that domestic manufacturers endure. This is partly due to the fact that it is very difficult to recover damage claims from companies located overseas. 6/ Also, foreign industry officials state that since they chose not to produce and/or sell smaller aircraft, their firms do not have as high a level of product liability insurance to add into the price of their airplanes.

1/ Ibid., p. 71.

2/ "Product Liability Called Prime Concern of Business Aviation," Aviation Daily, Apr. 19, 1985, p. 287.

3/ "Piper Aircraft Consolidates Manufacturing and Administration," Aviation Week and Space Technology, Aug. 12, 1985, p. 53.

4/ Speech by Brian E. Barents, Senior Vice President, Marketing, Cessna Aircraft Co., at the Eleventh Annual FAA Aviation Forecast Conference, Feb. 27, 1986.

5/ David H. Scott, "Liability," Sport Aviation, August 1985.

6/ "Our Costly Liability Lottery, Part II," Business and Commercial Aviation, August 1985, p. 11.

Financing

Although it would be an overstatement to say that financing sells the airplane, availability of favorable financing definitely influences the choice between aircraft that are matched on technical merits. 1/ Availability of a financing package is especially instrumental to the success of the high-priced, new-generation commuter aircraft. 2/ The world has changed so that "it is no longer enough to build a good aeroplane. To stay alive in this business, you've got to offer airlines a financing package which at the very least matches your rivals." 3/

Data regarding typical financing packages offered potential purchasers was gathered in the Commission questionnaire. 4/ These arrangements vary considerably, depending on the individual situation. However, a general summary of these terms during 1980-84 is shown in the following tabulation.

Item	U.S. producers	Foreign producers
Initial deposit	10-30 percent	10-20 percent.
Amount financed	70-90 percent	80-90 percent.
Interest rate	10.4-15.0 percent	8.5-13.25 percent.
Loan period	60 to 120 months	60 to 144 months.

Although these responses differ only slightly, the consensus in the aircraft-purchasing community is that financing from importers is more advantageous than that available from U.S. manufacturers. One of the reasons for this stems from the fact that sales outside their home market are exports, and, thus, foreign manufacturers are often able to take advantage of export credit programs. Although U.S. importers indicate that these credits are used sparingly, purchasers do benefit in interest savings. The effect of subsidized export credits applied to commuter aircraft offered in the United States were documented in a previous Commission study. For example, with official financing assistance, interest costs for a $1.8 million aircraft totaled 7.7 percent of total operating costs compared with 12.4 percent with financing at market rates. 5/

Individual responses to Commission questionnaires regarding financing terms offered to potential purchasers cannot be revealed, as these data are business confidential. However, information from public sources illustrate some of the financing packages offered by U.S. and foreign general aviation producers.

1/ R. Sarathy, "Feast or Famine? Prospects For The New Generation Turboprop Aircraft," Transportation Journal, September 1984, p. 14.

2/ Speech by Stephane Daillencourt, Sales Financing Manager, Aerospatiale Corp. at the Airfinance Journal Conference, Nov. 14, 1984.

3/ Jeff Randall, "Financing Packages," Commuter World, June-July 1984, p. 54.

4/ This discussion of financing relates to both commuter and business aircraft. However, it is recognized that the issue of financing is much more important to commuter airlines then to most business aircraft purchasers.

5/ U.S. International Trade Commission, Economic Impact of Foreign Export Credit Subsidies on the U.S. Commuter Aircraft Industry: . . . ., November 1982, p. 24.

Cessna Aircraft Co.--Cessna does have an in-house financing agency to assist purchasers. Generally, however, financing is at a rate slightly above the prime rate. The firm has, during the past 4 years, offered innovative schemes in an attempt to stimulate sales in selected product areas. In mid-1983, the company extended 10.5-percent financing for the first year on single- and twin-engine piston aircraft sold outside the United States. The purchase would then be financed at a fixed interest rate of 15.0 to 15.5 percent or a 2.5-percent-plus-prime floating rate for the remaining term (5 years for single pistons, 6 years for twin pistons). This proposal existed only a few months and ended November 30, 1983. 1/ For U.S. purchasers, a similar financing proposal was made in mid-1985 for qualified buyers of single- or twin-engine piston airplanes. There would be no payments on the loan until March 1, 1986, with financing at 3 percent below prime for the first year after this free period. A downpayment of 10 percent was required, with the loan term ranging from 5 to 6 years. For one of the company's turboprop aircraft, the Conquest, Cessna offered no monthly payments through January 31, 1986, 10 percent downpayment and financing at 3 percent below prime for 10 years. Both of these financing schemes were offered during a 2- to 3-month period ended September 30, 1985. 2/

Piper Aircraft Corp.--Little public information is available regarding Piper's financing of commuter and business aircraft. The firm previously had an in-house financing organization but has recently disbanded it in favor of an agreement with Chase Manhattan Corp. to provide "innovative financing for dealers and customers." 3/

Beech Aircraft Corp.--Some recent purchasers of this firm's model 1900 commuter aircraft have received financing (with assistance from the company's financing subsidiary) at 9 percent for the first 3 years, with an adjustable interest rate for the remaining 5 years of the loan. Beech has also offered third-party leasing arrangements at competitive rates for a maximum 10-year period. 4/

Gates Learjet Corp.--Public data regarding financing provided by Gates for purchasers of commercial business aircraft are not available. The firm does not, however, have a financing subsidiary, and company officials indicate that they generally do not become involved in the actual financing of their aircraft. Gates did recently arrange a leasing agreement at commercial rates involving the majority of the business jets built for the U.S. Air Force. 5/

Gulfstream Aircraft Corp.--Little public information is available regarding Gulfstream financing of business aircraft. The company does not have an internal financing organization owing to the fact that the majority of their aircraft are sold to corporations that do not require seller financing. 6/

1/ "Cessna Finances Non-U.S. Sales," Flight International, Aug. 6, 1983, p.

2/ Various advertisements in Business and Commercial Aviation, September 1985, pp. 97 and 163.

3/ "Aviation Intelligances," Business & Commercial Aviation, September 1985, p. 28.

4/ Alison Chambers and Jeff Randall, "Financing A High Risk Venture," Flight Internation, June 15, 1985, p. 12.

5/ Gates Learjet Press Release, July 30, 1985, and Commission staff discussions with company officials in June 1985.

6/ Discussions with company officials, June 1985.

Fairchild Aircraft Corp.--Public data regarding financing of commuter and business aircraft by Fairchild are not available. Corporate officials indicate that they are aware of the importance of financing in the commuter and small-medium business aircraft market. Although the firm does not have a specific in-house financing subsidiary, they do employ personnel dedicated primarily to assisting purchasers obtain financing.

Mooney Aircraft Corp.--There are no data available regarding this French-owned firm's involvement in financing purchases of their business aircraft.

Mitsubishi Aircraft International.--Officials of Mitsubushi Aircraft International state that the firm does not receive any financial support or indirect subsidies from the Ministry of International Trade Institute, their parent corporation, or Japanese-owned banks. The firm, which does not have a financing subsidiary, offers conventional third-party financing with U.S. lending institutions to their aircraft purchasers. 1/ The firm has, however, recently offered below-market financing at 8.5 percent interest for the first 2 years of the loan for buyers of their business jets. 2/

Short Brothers Aircraft (USA).--In November 1982, Short Brothers (of Northern Ireland) established an $80 million financing facility (composed of commercial banks) to support sales of U.S. aircraft. This total was fully utilized in 1983, and the firm further increased its financing resources in 1984. The company reportedly has offered 100-percent financing on some aircraft purchases, with a loan term of 10 years. 3/ Further public data are not available.

Dornier GmbH.--This West German firm has, to date, had only limited sales in the U.S. market. Currently, the company does not have a financing package to offer prospective purchasers, but Dornier officials indicate that the formation of a financing subsidiary, to help stimulate U.S. sales, is being considered. 4/

CASA/Nurtanio.--Little public data regarding financing packages offered by CASA and/or Nurtanio are available. Company officials note that "the Spanish-Indonesian enterprise would engage its competitors on the issue of financing for the aircraft." However, since many of the sales of this aircraft have been to military customers, the firm does not plan to finalized its financing scheme until closer to the time of aircraft certification. 5/

Saab/Fairchild.--This firm has established its own financial corporate with a U.S. credit line of $125 million (backed by a syndicate of commercial banks) to provide financing for worldwide sales of the SF 340. This organization is reportedly able to provide funding in different currencies. 6/ Data regarding interest rates or loan terms are not

---

1/ Submission of Mitsubishi Aircraft International, Aug. 9, 1985, p. 2.

2/ "Mitsubishi Will Give 8.5% Rate to Buyers," NBAA Convention News, Sept. 24, 1985, p. 81.

3/ "Fresh Developments In Commuter Financing," Airfinance Journal, February 1984, p. 18.

4/ Ibid.

5/ Jaff Randall, "Financing Packages," Commuter World, June-July 1984, p. 55.

6/ Fresh Developments In Commuter Financing," Airfinance Journal, February 1984, p. 18.

available. However, Saab officials indicate that although financing is available from the Swedish Central Bank, purchasers have been able to find more advantageous rates from commercial banks.

Israel Aircraft Industries.--Public data regarding financing of Israeli business jets, either by the manufacturer or its U.S. distributor, are not available.

Fokker.--Industry sources note that Fokker has a financing package for the firm's 50-seat commuter airplane, which is strongly supported by the Dutch Nederlandsche Creditverzekering Maatschappij (NCM). This organization gives direct guarantees against airline risk to banks financing the sale of F-27 aircraft. Fokker has also been able to offer lower interest rates than many of its international competitors by financing in Dutch guilders instead of U.S. dollars. 1/

Aerospatiale/Aeritalia.--These manufacturers are reportedly offering a package known as "Master Lease," which is a 100 percent leverage lease arrangement for 10 to 12 years. The Government export credit agencies of both France and Italy are also reportedly offering loan guarantees for purchasers of the ATR 42. 2/ Other financing data are business confidential.

Dassault.--This firm does not have a financing subsidiary for its business aircraft. Neither Dassault nor its U.S. distributor, Falcon Jet, reportedly offers financing to prospective buyers. They do have access, according to company officials, to COFACE loans, but these are rarely used. 3/

deHavilland.--Public data regarding deHavilland's involvement in financing the sale of commuter or business aircraft during 1980-84 are not available. However, the firm recently financed a sale of its new commuter airliner at extremely generous terms. The financing package given to Liat, a Carribean airline, consisted of two separate components. The first was a 10-year loan from the Canadian Export Development Corp. for almost 58 percent of the total purchase cost. The remaining cost was financed by a grant from the Canadian Government. The grant was in the form of a 50-year, interest-free loan with a 10-year moratorium on repayment. 4/

Canadair Ltd.--Public data regarding this firm's involvement in the financing of its business jets are not available.

Embraer.--This company consistently offered below-market financing to all potential purchasers, subsidized by the Brazilian Government, during 1980-84. 5/ Industry sources note that Embraer offered 7.5- to 8.5-percent financing for an 8- to 10-year term on its 19-seat commuter airplane. 6/ These loans are tied into the Brazilian export credit system. In 1985, this

---

1/ Jeff Randall, op. cit.

2/ Karen Floersch and Robert Trerorrow, "Special Report: Commuters," Airfinance Journal, 1985, p. 26.

3/ Testimony of Frank Wiesekal, President, Falconjet Corp. before the U.S. International Trade Commission, Aug. 26, 1985.

4/ "List Dash 8 Financing Clarified," Airfinance Journal, 1985, p. 30.

5/ Jeff Randall, op cit.

6/ "Fresh Developments In Commuter Financing, "Airfinance Journal, February 1984, p. 18.

firm financed 90 percent of a $27.5 million loan for the purchase of 5 Brazilias at a 9- percent fixed interest rate for 10 years. 1/

British Aerospace.--Public data regarding British Aerospace financing of business aircraft sales are not available. In regard to commuter aircraft, company officials indicate that they do not have an in-house financing organization because they tailor each arrangement to the individual customer's needs. 2/ The firm states that it does not receive export credit subsidies from the British Government. 3/ However, data obtained from commuter airline annual reports indicate that the firm has offered generous financing terms for its Jetstream 31 commuter aircraft. In a recent sales arrangement with Metro Express Airlines, this carrier received a 12-month, interest-free loan, and a 7.96-percent interest rate thereafter for the 132 remaining months of the term. The airline also received a cash grant up front of $1 million. 4/ In a similar arrangement with Jetstream International Airlines, a $1.2 million grant from British Aerospace was received at the time of aircraft delivery to "help defray the costs of introducing the aircraft into service." 5/ With regard to sales outside the United States, the British Government recently agreed to provide 3.8 million pounds in financing to a Carribean airline purchasing British Aerospace's new aircraft, the ATP. The aircraft are being funded, according to Government officials, because "they will increase the links between commonwealth nations in the Carribean and other parts of the region." 6/

Other financing considerations.--In addition to generous financing offered, commuter and business aircraft producers often compete with political pressure in the financing area. In a recent example, the EC refused to provide financial backing for a British product, insisting that it would only assist in financing if the French/Italian ATR42 were purchased. 7/

Data compiled during the course of study indicate that once an aircraft is in production, there is little room for changes. Therefore, price and financing terms are used to gain competitive advantage over other producers. 8/ U.S. producers, however, being privately owned, are generally uncompetitive and often unsuccessful in their financing offerings. This is a major reason for their lack of competitiveness in many product areas. 9/

Exchange-rate factors

Data collected in this study indicate that during the period reviewed, one of the most important factors affecting the international competitiveness

---

1/ "Intelligence, "Aviation Daily, May 2, 1985, p. 9.
2/ Ibid.
3/ Submission of British Aerospace, Inc., Aug. 12, 1985, p. 6.
4/ Metro Airline Inc., Metro Airlines Fiscal 1984 Report, 1985.
5/ Deloihe Haslun-Sells, Jetstream International Airlines Inc. Consolidated Financial Statements for the Years Ended September 30, 1984 and 1983, 1985, p. 8.
6/ "Liat Juggles with Makers," Flight International, Apr. 13, 1985, p. 4.
7/ "Squawks," Commuter World, September-October 1985, p. 58.
8/ "Fresh Developments In Commuter Financing," Airfinance Journal, February 1984, p. 21.
9/ Submission of William Britt, president, Britt Airways, Feb. 5, 1985.

of the U.S. commuter and business aircraft industries was the strength of the U.S. dollar. The domestic industries have faced a substantial increase in the cost of the dollar to foreign buyers, ranging as high as 130 percent during 1981-82 for exports to Mexico (table 34). 1/ Industry sources state that the growth of the dollar has been a significant hindrance to sales of business aircraft in Europe. Figure 4 illustrates the growth in European currencies vis-a-vis that of the U.S. dollar. Similarly, foreign firms experienced a gain in exchange rates, allowing their aircraft to be more competitive in the U.S. market. Tempering this disadvantage was the substantial percentage of U.S. components incorporated in foreign aircraft.

Government involvement

As stated earlier in this report, many of the foreign producers currently competing with the U.S. commuter and business aircraft industry are owned by their governments. Because these firms are State owned, they enjoy several important competitive advantages. Several of these have already been noted, including preferential access to materials and labor and the availability of capital for both operations and research and development. An additional important benefit of State ownership, discussed earlier, is the ability to obtain purchaser financing, often at highly preferential rates or terms, by working with their national banks.

The benefits of being the sole supplier of aircraft for their domestic market is often cited as another competitive advantage State-owned commuter and business aircraft producing firms frequently have. This guarantees these firms a level of output upon which they can base future plans. In order to secure this, foreign governments will often impose explicit embargoes on imported commuter and business aircraft or will require complicated procedures to import a plane. 2/ These restrictions are most often imposed in the early years of an industry's development, with the country citing the "infant industry" economic principle as its rationale. However, once in place, these regulations are difficult to eliminate. State-imposed restrictive policies not only assure a production base, but also effectively protect the industry from foreign competition. 3/ Both of these effects allow the manufacturer to gain expertise and lower costs because of economies of scale, potentially making it more competitive internationally.

However, one of the most important benefits of government ownership can be the elimination of the producer's need to remain profitable to survive. Because of the prominence of an aircraft industry, many central governments will subsidize financial losses for various periods in order to maintain the industry. Reasons given for this involve the international prestige, the retention of a skilled workforce, the importance of an export industry, or national defense. These rationales allow foreign manufacturers to sustain a

1/ The Mexican peso went through a major devaluation in 1982 causing the U.S. dollar to sharply appreciate.

2/ Ravi Sarathy, "High Technology Exports from Newly Industrializing Countries: The Brazilian Commuter Aircraft Industry," California Management Review, Winter 1985, pp. 65-66.

3/ Ibid.

Table 34.—Changes in exchange rates 1/ between the U.S. dollar and currencies of major U.S. export markets of commuter and business aircraft, 1979-84

(In percent)

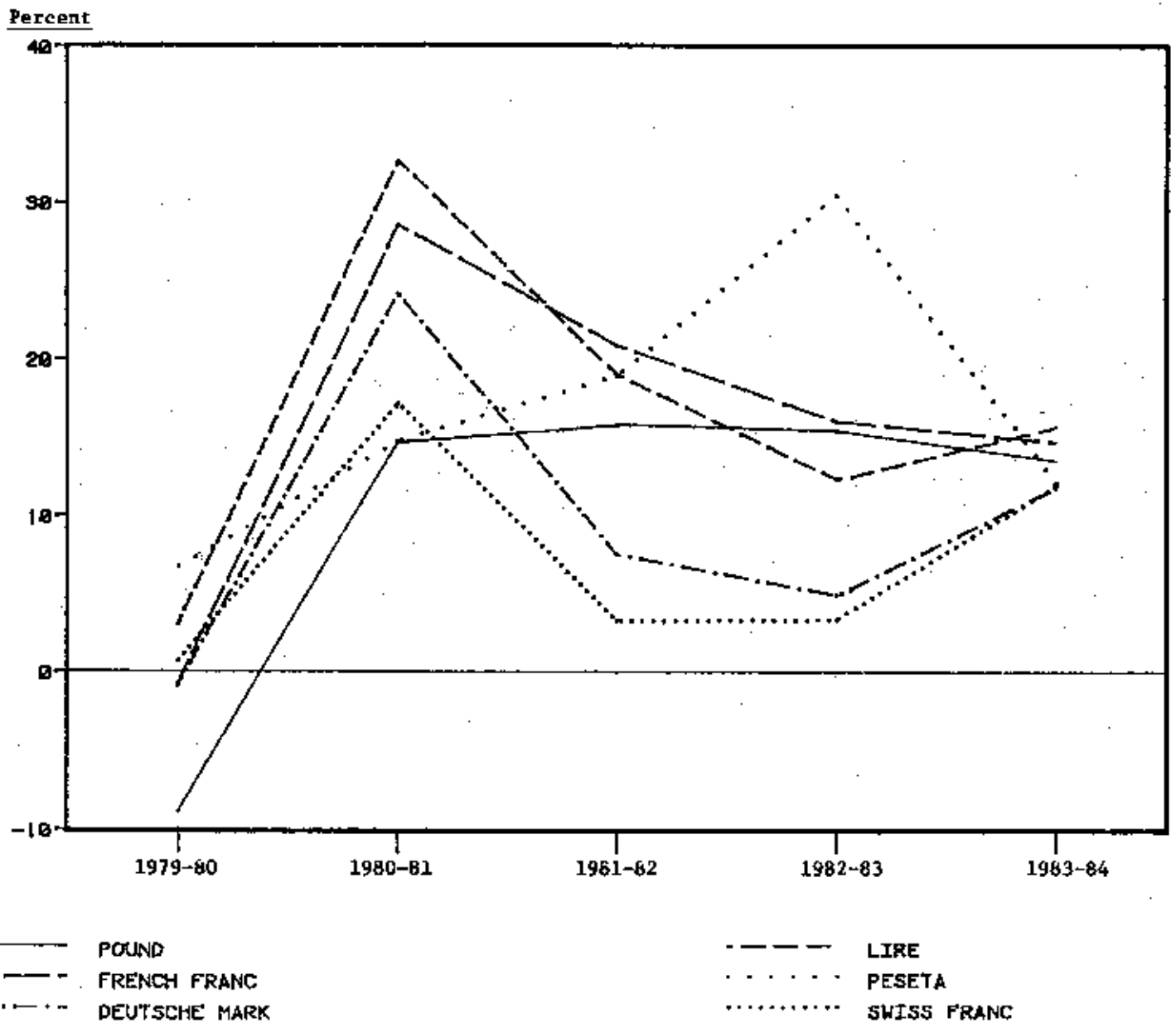
Country	Unit of currency	1979/1980	1980/1981	1981/1982	1982/1983	1983/1984
United Kingdom	Pound 2/	-8.8	14.7	15.8	15.4	13.5
France	French Franc 3/	-.7	28.6	20.9	16.0	14.7
West Germany	Deutsche Mark 3/	-.8	14.2	7.5	4.9	11.8
Italy	Lire 3/	3.1	32.7	19.0	12.3	15.7
Spain	Peseta 4/	6.8	14.8	19.0	30.6	12.1
Switzerland	Swiss Franc 2/	.8	17.2	3.3	3.4	11.9
Australia	Australian dollar 2/	-1.9	-.9	13.0	12.7	2.6
Mexico	Peso 4/	.6	.7	190.1	112.9	39.8
Saudi Arabia	Riyal 5/	-1.0	1.7	1.4	.8	2.0
Kuwait	Kuwaiti Dinar 6/	-2.1	3.1	3.3	1.2	1.5
Algeria	Algerian Dinar 6/	-.4	12.5	6.4	4.3	4.1
Republic of South Korea	Rand 2/	-7.6	11.9	24.3	2.4	29.1

1/ Exchange rates are in terms of foreign currency per U.S. dollar.
2/ Floats independently.
3/ Floats according to cooperative arrangement maintained under the European Monetary System.
4/ Managed float.
5/ Loosely tied to the U.S. dollar.
6/ Floats according to composite of several currencies.

Source: Compiled from official statistics of the International Monetary Fund.

102

Figure 4.--Changes in exchange rates between the U.S. dollar and currencies of major U.S. export markets of commuter and business aircraft, 1979-84.



Source: Official statistics of the International Monetary Fund.

103

marginal level of production that is far lower than the economics of the industry would normally allow. 1/

The U.S. industry claims it is at a disadvantage with regard not only to the policies of foreign governments, but also because of certain policies of its own Government that adversely affect their competitiveness. In contrast to the United States, in countries such as France and Japan, Government and industry work together to attain mutual objectives. Aircraft manufacturers cite recent tax proposals as an example of how the U.S. Government works against them. One domestic producer documented the loss of 25 sales, worth approximately $45 million, as a result of the Federal Government's announcement of its tax revision proposals in 1985. 2/ U.S. antitrust laws are another example. Because of these regulations, U.S. producers have been reluctant to even form research and development consortiums. 3/

Other regulations, including environmental, health and safety, and export control regulations are perceived by the U.S. industry to place them at a competitive disadvantage with many of their foreign competitors. Foreign industries, for the most part, are less encumbered by these types of regulations. Domestic manufacturers have voiced complaints about the increasing financial burden of meeting these domestic regulatory requirements.

Purchasing criteria

Commuter aircraft.--In response to Commission questionnaires, commuter airlines were asked to indicate those factors most important in their decision of which aircraft to purchase. Those criteria and the results of the operators' responses are shown in table 35. The passenger capacity of the aircraft was overwhelmingly noted as the most important criteria in aircraft acquisition. This was confirmed in discussions with officials of regional airlines. Price stood out as the second important purchasing factor. Quality of the product and fuel efficiency were indicated as the third and fourth criteria. Fifth and sixth considerations were range and reputation.

Financing ranked seventh among the criteria considered in which aircraft to purchase. However, data obtained from meeting with commuter airline executives show that price and financing are of critical importance to the vast majority of purchasers. This is predominantly because of the cash shortage and unstable equity position of most regional airlines. Research did not indicate, however, that financing is the most important factor, but that the ability of favorable financing to lower the purchase price per seat-mile and the average cost per-seat mile make it a factor that receives considerable weight in the decision process.

1/ Fred Weisman, "Changing Future Values of Business Aircraft," Airfinance Journal, September 1984, p. 30.

2/ "Does Anyone Care?" National Air Transportation Association, Air Trans News, August 1985, p. 3.

3/ Recently, however, legislation has been passed to reduce some of the antitrust fears that have plagued manufacturers with regard to research consortiums Dwight Davis, "R&D Consortia," High Technology, October 1985, pp. 42-43.

Table 35.—Commuter aircraft: Share of responses in ranking of criteria used by U.S. purchasers in aircraft acquisition 1/

(In percent)

Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Passenger capacity	33	12	15	10	12	5	–	2	3	2	2	3	–	–
Price	18	13	18	11	6	3	2	5	6	3	11	3	–	–
Quality	16	9	11	12	11	14	4	5	4	9	5	–	–	–
Fuel efficiency	3	19	15	10	15	8	12	5	8	5	–	–	–	–
Range	5	14	5	12	7	9	10	9	2	9	3	12	3	–
Reputation of the aircraft	9	13	7	–	9	14	11	9	5	7	5	7	4	–
Financing terms	5	9	11	8	2	4	4	2	7	5	11	9	7	16
Technology and/or special features	9	7	7	5	4	4	7	9	11	11	11	5	7	4
Technical service support	–	–	4	9	9	14	11	12	16	14	5	4	2	–
Availability	3	3	3	10	9	7	14	11	5	10	10	7	7	–
Engine characteristics	–	9	5	9	7	10	11	17	14	7	10	–	–	–
Fleet standardization	–	7	9	4	5	9	4	5	11	–	15	14	7	9
Pressurization	–	–	6	4	4	8	11	8	6	6	6	11	19	13
Market inducements	2	2	–	4	–	2	2	2	2	6	6	9	23	40
Noise considerations	–	–	2	–	–	–	–	–	–	–	–	–	2	–

1/ Ranked in order of cumulative total for the top five criteria.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Note.—Because of rounding, figures may not add to 100 percent.

105

Table 36.—Business aircraft: Share of responses in ranking of criteria used by U.S. purchasers in aircraft acquisition 1/

Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Passenger capacity	22	20	20	10	10	5	-	-	5	8	-	-	-	-
Range	12	19	15	17	7	12	4	5	7	-	-	2	-	-
Price	10	21	17	-	12	2	-	7	5	10	-	7	9	-
Reputation of the aircraft	9	14	20	19	5	14	12	-	-	8	-	-	-	-
Fuel efficiency	5	7	17	21	14	7	7	12	5	-	2	-	2	-
Financing terms	-	9	-	-	-	9	-	3	3	3	3	20	26	24
Technology and/or special features	5	3	3	5	7	14	8	-	8	16	22	3	6	-
Technical service support	-	-	10	2	5	18	23	15	12	6	1	2	5	-
Quality	21	18	7	14	16	-	5	3	-	12	4	-	-	-
Availability	-	-	11	3	14	5	8	3	-	11	17	29	-	-
Engine characteristics	3	-	2	10	3	16	8	5	24	15	13	1	-	-
Fleet standardization	-	11	-	2	1	-	17	11	-	15	23	14	1	4
Pressurization	3	-	11	19	13	4	-	6	28	12	1	2	-	1
Market inducements	-	-	-	3	-	-	-	8	2	6	13	10	23	34
Noise considerations	-	-	-	6	-	-	-	-	-	-	-	-	-	-

1/ Ranked in order of cumulative total for the top five criteria.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Note.—Because of rounding, figures may not add to 100 percent.

106

Business aircraft.--Import purchasing criteria of large corporations with professional flight crews and medium- and small businesses whose owners operate the aircraft are shown in table 36. These purchasers, in response to the Commission's questionnaire, indicate that the size of the aircraft (i.e., passenger capacity) was the most important consideration in their purchase, followed closely by the quality of the aircraft. Range and price were noted as the second and third most important criteria considered. The aircraft's reputation and fuel efficiency were also stated as leading criteria in aircraft acquisition.

Discussions with purchasers of business aircraft in the course of this study confirmed that the price of the plane was one of the most important considerations. Sources in the major subcomponent industries also noted that price is critical to potential aircraft buyers and that financing is less important. Financing is generally not a critical factor, because the majority of businesses will pay in full at the time of delivery. Respondents to the Commission's questionnaire substantiate this, as 70 percent of the business aircraft purchasers surveyed listed financing as one of the last three factors considered in their decision.

U.S. producers' responses to import competition in the U.S. market

In response to import competition in the U.S. market, 17 percent of domestic commuter aircraft producers and 28 percent of business aircraft manufacturers indicated that they did not take any specific measures, because imports have not been a significant enough factor in their market segments to warrant any actions (table 37). These manufacturers generally compete in the lower segments of both of these markets and indicated that imports have not yet affected their operations. Other producers stated that they took little action because they lacked the necessary funds to counter foreign competition.

Almost all of the respondents to the Commission's questionnaire indicated that they had implemented cost reduction efforts to improve their competitive position in the U.S. market. Cost reductions were realized through consolidation of production activities, elimination of excess manufacturing costs, and more efficient utilization of manpower. Cessna Aircraft Co., for example, will installed a computerized planning control system during 1986 and reduce the number of aircraft assembly lines from 13 to 7. Gates Learjet, on the other hand, has held discussions with subcomponent manufacturers in an attempt to obtain lower prices. 1/ Approximately 50 percent of commuter aircraft producers and 33 percent of business aircraft manufacturers indicated that they had made strides in improving their product's quality. Several industry members stated that they had also reduced their plane's price or improved the financing offered to prospective purchasers. Gates Learjet Corp. announced in September 1985 a 17-percent reduction in the price of its aircraft. 2/ Finally, 33 percent of commuter airplane manufacturers and 67 percent of business airplane producers indicated that their firms reduced production. Several also noted that they were forced to close production lines in response to import competition.

1/ David M. North, "Business Aircraft Makers Stress New Technology to Cut Product Costs," Aviation Week & Space Technology, Sept. 30, 1985, p. 16.

2/ "Gates Slashes Learjet Tags," NBAA Convention News, Sept. 24, 1985, p. 102.

Table 37.--Commuter and business aircraft: U.S. producers' responses to import competition in the U.S. market, 1980-85

(Percent)

Nature of response	Commuter aircraft	Business aircraft
Took no or few actions because firm:		
Had already shifted to other lines of aircraft	-	-
Lacked capital funds to counter foreign competition	50	33
Was not impacted by increased foreign competition	17	28
Took the following actions:		
Reduced or dropped plans to expand capacity	-	-
Cut back production	33	67
Closed production lines or product manufacturing	17	50
Modified existing aircraft	-	33
Implemented cost reduction efforts	66	100
Improved quality of the product	50	33
Reduced price/improved financing terms offered	17	50
Imported aircraft	-	-
Opened a plant to manufacture abroad	-	-
Engaged in joint ventures or coproduction	17	17

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

The general aviation industry has also responded to increased foreign competition by forming the American Business Aircraft Committee. This organization, composed of the chief executives of six domestic aircraft manufacturers, organized a campaign to convince potential purchasers of business aircraft to buy U.S.-made products. The motives they cited included the trade deficit in this sector, subsidized unfair import competition in the U.S. market, restricted access to foreign markets, and the need to preserve and maintain a healthy aircraft industry. 1/

Additionally, somewhat more radical proposals have been made by industry sources to various Government agencies. One of these includes the denying of airworthiness certification of aircraft built in countries where U.S. producers do not have free or fair access to the market. This suggestion, however, could be considered not in accordance with the GATT. 2/ Recently, however, a bill was proposed by Senators John Heinz and Max Baucus in the U.S. Senate and Representative Frank Guarini in the U.S. House of Representatives in July 1985 to counter injurious foreign government action to strengthen their industries at the expense of U.S. industrial sectors (including general aviation aircraft) and to prevent unfair trade practices that restrict U.S. exports. 3/

1/ American Business Aircraft Committee, Foreign Challenges To U.S. Business Aircraft Leadership, Washington, DC, 1984.

2/ Data provided by the Office of the U.S. Trade Representative.

3/ "Trade Bill Would Block Damage to U.S. Firms," Aviation Week & Space Technology, July 15, 1985, p. 95.

Future Trends in the U.S. Market

Next-generation products

Worldwide there are a number of new commuter and business aircraft under development or actually in production. These planes are due to be delivered during the next 3 years. Currently six commuter aircraft are undergoing production testing and/or certification requirements. Another two aircraft are undergoing modification (stretching) of the existing airplanes. All of these planes will seat over 30 passengers. Primary manufacturers of these new- generation regional aircraft are located in Northern Ireland, Great Britain, the Netherlands, France, Italy, Spain, and Indonesia. The price of these planes are expected to range between $5.3 million and $14.9 million. It is important to note that since Fairchild Aircraft Corp. decided to dissolve its partnership with Saab Scania to become only a subcontractor, there are no U.S. firms providing or developing new-generation commuter aircraft. 1/

In the business aircraft market, nine new aircraft are being offered for delivery during 1986-88. Several of these planes incorporate state-of-the-art technology with regard to composites, propulsion, and avionics. This includes airplanes produced in the United States (one from Japanese and American parts and one from Italian and American parts), Israel, Great Britain, France, and Northern Ireland. However, the manufacturer located in Northern Ireland is currently in bankruptcy proceedings, and the future of this aircraft is in question. The prices of these new generation-business airplanes range between $750,000 and $15.0 million.

Future market potential

There is little consensus as to the size of the future world market for commuter and business aircraft. The highly cyclical nature of the business, currency volatilities, and other potentially growth-inhibiting forces combine to present a very uncertain future. Several industry sources, however, have made estimates of these future sales, as shown in table 38. Forecasts for overall commuter aircraft sales range from 1,500 to 5,000 units between 1984 and 2000. Future business aircraft sales were estimated to be $40 billion by 1995.

1/ The Boeing Corp.'s recent purchase of the Canadian commuter aircraft producer, deHavilland, constitutes the only U.S. entry in the large commuter airplane market, although the plane is actually produced in Canada.

Table 38.--Commuter and business aircraft: Future world market forecasts, 1984-2000

Time period	Estimator	Aircraft type	Quantity	Value
			Units	Million dollars
1984-93	Frost & Sullivan.	All commuter	1,500	8,000
1984-2000	Aerospace Corp	do	5,400	16,600
1984-2000	British Aerospace.	do	5,500	42,000
1984-93	Forecast Associates.	All turboprop	12,457	49,500
1984-2000	Aerospace Corp	20-40 seat commuter.	2,000	1/
1984-2000	Stephane Diallencourt.	20-70 seat commuter.	3,311	1/
1984-94	CASA	30-50 seat commuter.	1,800	1/
1984-95	deHavilland Corp.	do	1,500-2,000	1/
1984-95	Aerospatiale Corp.	do	2,800-3,000	1/
1984-2000	Aerospace Corp	41-60 seat commuter.	1,200	1/
1984-95	British Aerospace.	All business aircraft.	1/	40,000

1/ Not available.

Source: Michael Days, "Small Carriers Spark Demand In Turbo-Props," Wall Street Journal, May 11, 1984, p. 33; Aerospace Industries Association, The U.S. Private Business and Light Transport Aircraft Industries, October 1984, p. 27; Les Tuck, British Aerospace, Inc., "Open Markets," Quarterly, November 1984, p. 2; William Dane, "The Market for Turbo-prop-Powered Aircraft, Through 1993," Defense Weekly, Feb. 8, 1985, p. 7; Speech by Stephane Daillencourt entitled, "Manufacturers and Financing Packages," before the Air Finance Journal Conference, Nov. 14, 1984; "DHC: Clean As A Whistle," Flight International, Show Daily, June 5, 1985, p. 29; and Interviews with Aerospatiale Corp. officials, June 7, 1985.

There have also been numerous estimates formulated regarding growth rates in these industries over the next decade. Frost and Sullivan expect market growth for overall general aviation aircraft (the majority of which is made up of commuter and business airplanes) to be 2 percent per annum through 1989. 1/ The FAA takes a more optimistic view, predicting that the general aviation piston fleet will grow by 2.4 percent per year; the turbine fleet, at

1/ Michael Days, "Small Carriers Spark Demand In Turbo-Props," Wall Street Journal, May 11, 1984, p. 33.

5.8 percent; and the commuter aircraft fleet, to increase by 3.9 percent per year through 1995. 1/ The Transportation Research Board of the National Research Council estimates that by 1985 the regional airline fleet will total 2,200 to 2,800 aircraft. 2/ These variations in estimates illustrate the differing preceptions of the future commuter and business aircraft market and the uncertainty involved in it.

These growth estimates can be affected by a number of factors. In the commuter area, it is anticipated that U.S. travel will continue to increase, and major and national airlines will further interline with the small carriers, stimulating the market for commuter aircraft. In foreign markets, the effects of airline liberalization and partial deregulation in areas such as Europe and Canada may further bolster this market segment. Continued growth in the business area may hinge on further industrial decentralization, continued effects of deregulation on scheduled airline service, and the cost effectiveness of company airplanes. 3/ Also, industry observers now expect that interest rates, which in the past have prohibited general aviation aircraft acquisition, will be more stable in the next 5 years. 4/ Industry sources indicate that in developing nations, where there are few rail or highway networks, general-aviation-type airplanes could provide instant transportation systems with much smaller capital investments than land transportation requires.

However, a number of growth-inhibiting forces could severely limit new commuter and business aircraft sales in the next decade. One common concern of both industries is the proposed new U.S. tax revision legislation which would eliminate the investment tax credit and modify the depreciation system. Another shared concern is the growth of airport access restrictions, which could limit commuter and business operations in the United States. Noise restrictions at various airports could also dampen expansion of operations for potential purchasers of general aviation aircraft. Finally, some analysts predict that new aircraft sales may be depressed by improved teleconferencing technology. 5/

In commuter aircraft, the elimination of the Essential Air Service (EAS) program 6/ could result in a temporary supply of aircraft that would have to be rerouted, since many small carriers might discontinue serving some routes

---

1/ U.S. Department of Transportation, Federation Aviation Administration, FAA Aviation Forecasts Fiscal Years 1985-1996, February 1985.

2/ Transportation Research Board, National Research Council, Transportation Reseach Circular, February 1986, p. 3.

3/ James Bauchspies and William Simpson, ORI, Research and Technology Progress Perspectives for General Aviation and Commuter Aircraft, September 1982, pp. 2-8.

4/ "Industry Looking Good," Aviation Week and Space Technology, May 20, 1985, p. 76.

5/ "Aviation Intelligence," Business and Commercial Aviation, July 1985, p. 32.

6/ The EAS program, established under sec. 419 of the Deregulation Act of 1978, guaranteed "essential air service" for 10 years to all eligible communities (those receiving scheduled service on the date of passenge, or to those whose authorization service had been suspended). Under this provision, commuter carriers providing this service receive a subsidy payment from the U.S. Government in addition to passenger fares. Currently, there are approximately 235 cities being served under the EAS program.

without government subsidization. The resale or rerouting of their aircraft would most likely increase competition and perhaps reduce the demand for new aircraft. The EAS program, although not scheduled to cease until 1988, is not funded under the fiscal year 1986 U.S. Department of Transportation budget. 1/ Also, the recent airline crashes involving commuter aircraft could undermine public confidence in this segment of the transportation industry, limiting growth in passenger traffic. 2/

Future competitiveness for U.S. producers in both the commuter and business aircraft industry depends on several factors. These include the ability of the manufacturers to continue to produce high-quality aircraft at reasonable prices, a stable economic environment for airplane acquisitions, effective U.S. marketing and support organizations, and a large market base, centered in the United States. 3/ Other important factors noted by U.S. producers include a stable U.S. dollar (vis-a-vis foreign currencies), relief from excessive product liability insurance premiums, and a reduction in foreign government intervention in the market.

In response to Commission questionnaires, commuter airlines surveyed indicate the intent to purchase 445 aircraft over the next 5 years (table 39). The largest part of this demand will occur in the 30- to 50-seat aircraft market. Airlines noted increasing traffic, expanding route systems due to interlining, and the need to replace older aircraft as the driving forces behind future acquisitions.

Regarding business aircraft, questionnaire respondents stated that they anticipate purchasing 358 airplanes during 1985-89 (table 39). Factors such as the inconvenience of scheduled airline service and the increasing geographic dispersal of corporate activities were noted as the reasons for anticipated acquisitions. The greatest number of future contract awards are expected to be for turboprop business planes and medium-size business jets.

1/ "FAA Budgeted $5.1 Million, EAS Eliminated, Legislation Announced," Commuter/Regional Airline News, Feb. 11, 1985, p. 1.

2/ R. Sarathy, "Feast or Famine? Prospects For The New Generation Turboprop Aircraft," Northeastern University, College of Business Administration, September 1984.

3/ U.S. Department of Commerce, International Trade Administration, A Competitive Assessment of the U.S. Civil Aircraft Industry, March 1984, p. 13-12

Table 39.--Commuter and business aircraft: U.S. purchasers' future contract awards, by types, 1985-89

Item	1985	1986	1987	1988	1989
Commuter aircraft:					
8-14 seats	10	8	3	2	2
15-19 seats	26	20	10	10	8
20-29 seats	8	6	0	0	0
30-50 seats	49	69	54	30	24
51-60 seats	5	9	9	4	6
61-80 seats	11	11	12	21	18
Total	109	123	88	67	58
Business aircraft:					
Single engine piston	18	6	5	5	4
Single engine piston	7	4	5	4	3
Turboprop engine	27	19	30	24	20
Turbojet engine:					
Maximum ramp weight 20,000 pounds or less	8	14	12	0	0
Maximum ramp weight 20,001 pounds to 35,000 pounds	16	24	24	12	8
Maximum ramp weight 35,001 pounds but not over 70,000 pounds	14	12	11	15	7
Total	90	79	87	60	42

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

In conclusion, the future competitiveness of the U.S. commuter aircraft industry will be limited to an extremely narrow and declining segment of the market. The domestic industry does not produce any aircraft for more than 19 passengers. The one U.S. producer that was involved in joint production of a larger commuter aircraft has decided to terminate the partnership in favor of a subcontractor role. Since the majority of future commuter aircraft purchases are expected to be for airplanes capable of transporting 30 to 50 passengers, foreign producers will dominate future markets. 1/

The U.S. business aircraft industry, however, is expected to remain an important force in the world market. Domestic producers are present in all sectors of the market and are at the forefront of many new technology applications. These factors, along with their broadly established marketing relationships in the world market, strong corporate backing, and sizable capital and research investments, should assist U.S. manufacturers in remaining competitive.

1/ The Boeing Corp.'s recent purchase of the Canadian commuter aircraft producer, deHavilland, constitutes the only U.S. entry in this market. The effect of this acquisition on the future competitiveness of the U.S. commuter aircraft industry is not known at this time.

APPENDIX A

NOTICES OF INSTITUTION OF INVESTIGATION NO. 332-204 AND PUBLIC HEARING

[332-204]

Competitive Assessment of the U.S. Commuter and Business Aircraft Industries

AGENCY: International Trade Commission.

ACTION: Scheduling of public hearing and postponement of deadline for filing written submissions.

FOR FURTHER INFORMATION CONTACT: Ms. Deborah Lakomirak, Machinery & Equipment Division, Office of Industries, U.S. International Trade Commission, Washington, D.C. 20436 (telephone 202-523-0131).

SUPPLEMENTARY INFORMATION:

Background

The Commission instituted the investigation on its own motion for the purpose of gathering information on the competitive position of the U.S. and foreign commuter and business aircraft industries. The study will assess the impact of the growing competition from imports on the U.S. commuter and business aircraft industries, explore the related development of further competition in overseas markets, and examine the steps taken in response to this increased competition.

Public Hearing

A public hearing in connection with investigation No. 332-204 has been scheduled for 10:00 a.m., on August 27, 1985, to be continued on August 28, 1985, if required, at the U.S. International Trade Commission Building, 701 E Street, NW., Washington, D.C. All persons shall have the right to appear by counsel or in person, to present information, and to be heard. Requests to appear at the public hearing should be filed with the Secretary, United States International Trade Commission, 701 E Street, NW., Washington, D.C., 20436, not later than the close of business (5:15 p.m.), August 13, 1985. All persons desiring to appear at the hearing and make oral presentations should file prehearing briefs. The deadline for filing prehearing briefs is August 15, 1985.

Written Submissions

In lieu of or in addition to appearances at the public hearing, interested parties are invited to submit written statements concerning the investigation. Commercial or financial information which a party desires the Commission to treat as confidential must be submitted on separate sheets of paper, each clearly marked "Confidential Business Information" at the top. All submissions requesting confidential treatment must conform with the requirements of § 201.6 of the Commission's *Rules of Practice and Procedure* (19 CFR 201.6). All written submissions, except for confidential business information, will be made available for inspection by interested persons. To be assured of consideration by Commission, written statements should be received no later than August 15, 1985. All submissions should be addressed to the Secretary at the Commission's office in Washington, D.C.

Posthearing briefs must be submitted not later than the close of business on September 3, 1985. A signed original and 14 true copies of each submission must be filed with the Secretary to the Commission in accordance with section 201.8 of the Commission's Rules (19 CFR 201.8).

Hearing-impaired persons are advised that information on this matter can be obtained by contacting our TDD terminal on (202) 724-0002.

Notice of the Commission's institution of the investigation was published in the Federal Register of January 23, 1985 (50 F.R. 3036).

Issued: July 15, 1985.

By order of the Commission.

Kenneth R. Mason,

Secretary.

[FR Doc. 85-17570 Filed 7-23-85; 8:45 am]

BILLING CODE 7020-02-M

confidential business information will be made available for inspection by interested persons. All submissions should be addressed to the Secretary, United States International Trade Commission, 701 E Street NW., Washington, D.C. 20436.

Issued: January 11, 1985.

By order of the Commission.

Kenneth R. Mason,

Secretary.

[FR Doc. 85-1653 Filed 1-22-85; 8:45 am]

BILLING CODE 7020-02-M

[332-204]

Competitive Assessment of the U.S. Commuter and Business Aircraft Industries

AGENCY: United States International Trade Commission.

ACTION: Institution of an investigation under section 332(b) of the Tariff Act of 1930 (19 U.S.C. 1332(b) for the purpose of presenting information on the competitiveness of the U.S. commuter and busines aircraft industries.

EFFECTIVE DATE: January 9, 1985.

FOR FURTHER INFORMATION CONTACT: Ms. Deborah Ludomirak or Mr. Eric Nelson, Machinery and Equipment Division, Office of Industries, U.S. International Trade Commission, Washington, D.C. 20436 (telephone 202-523-0131 or 202-523-4585).

Background and Scope of Investigation

The Commission instituted the investigation on its own motion for the purpose of gathering information on the competitive position of the U.S. and foreign commuter and business aircraft industries. The study will assess the impact of the growing competition from imports on the U.S. commuter and business aircraft industries, explore the related development of further competition in overseas markets, and examine the steps taken in response to this increased competition.

Written Submissions

Interested persons are invited to submit written statements concerning the investigation. Written statements should be received by the close of business on July 25, 1985. Commercial or financial information which a submitter desires the Commission to treat as confidential must be submitted on separate sheets of paper, each clearly marked "Confidential Business Information" at the top. All submissions requesting confidential treatment must conform with the requirements of § 201.6 of the Commission's *Rules of Practice and Procedure* (19 CFR 201.6). All written submissions, except for

APPENDIX B

CALENDAR OF PUBLIC HEARING

TENTATIVE CALENDAR OF PUBLIC HEARING

Those listed below appeared as witnesses at the United States International Trade Commission's hearing:

Subject : Competitive Assessment of the U.S. Commuter and Business Aircraft Industries

Inv. No. : 332-204

Date and time: August 27, 1985 - 10:00 a.m.

Sessions were held in the Hearing Room of the United States International Trade Commission, 701 E Street, N.W., in Washington.

DOMESTIC:

General Aviation Manufacturers Association, Washington, D.C.

Edward W. Stimpson, President

IMPORTERS:

Ross and Hardees--Counsel
New York, N.Y.
on behalf of

Falcon Jet Corporation

Frank W. Wisekal, President and Chief Executive Officer

Roy Bergstrom, Senior Vice President-Marketing

Jack Young, Vice President-Finance and Administration

Matthew A. Boyle, General Counsel and Corporate Secretary

Joseph S. Kaplan--OF COUNSEL

- more -

Short Brothers (USA), Inc., Arlington, Virginia

Langhorne M. Bond, President and Chief Executive Officer

OTHER INTERESTED PARTY:

Regional Air Line Association, Washington, D.C.

Alan Stephen, Vice President-Operations

APPENDIX C

A LISTING OF COMMUTER AND BUSINESS AIRCRAFT MODELS CURRENTLY IN SERVICE IN 1985 AND NEW MODELS UNDER DEVELOPMENT

Aircraft	Manufacturer	Country	Number of seats	1985 price (in current U.S. dollars)
Cessna utililiner II (402)	Cessna	United States	8	$508,505
Islander (BN2B-26	Pilatus and BN2B-20)	Switzerland	8	366,860-399,577
Trislander	Pilatus	Switzerland	8	712,340
T-1020	Piper	United States	8	515,740
T-1040	Piper	United States	9	944,810
Caravan II	Cessna/Reims	United States/France	9	1,200,315
Do-228 (101 and	Dornier 201)	West Germany	15-19	1,695,000-1,898,000
Nomad 24 1/	Government	Australia Aircraft Factories	16	2/
Tri-Commutair 1/	International Aviation	United States	16	735,000
Bandeirante	Embraer	Brazil	18	1,943,000
Twin Otter	DeHavilland	Canada	19	1,800,000
C99	Beech	United States	19	1,842,000
Arava	Israel Aircraft Industries	Israel	19	1,900,000
Metro (III and IIIA)	Fairchild	United States	19	2,500,000-2,600,000
1900	Beech	United States	19	2,842,000
Jetstream 31	British Aerospace	United Kingdom	19	2,850,000
C212	Casa	Spain	26	2,450,000
Nord 262 1/	Aerospatiale	France	27	2/
SD330	Short Brothers	Northern Ireland	30	3,355,000
G-1C 1/	Gulfstream	United States	32	2/
SF340	Saab Scania/ Fairchild 3/	Sweden/United States	34	5,600,000
Brasilia	Embraer	Brazil	30	4,716,000
SD360	Short Brothers	Northern Ireland	36	4,400,000
Dash 8	DeHavilland	Canada	36	6,000,000
CN 235 4/	Casa/Nurtanio	Spain/Indonesia	44	5,300,000
SD450 4/	Short Brothers	Northern Ireland	45	5,250,000
Super 748	British Aerospace	United Kingdom	48	6,000,000
ATR-42	Aerospatiale/	France/Italy Aeritalia	46-49	6,680,400
F-27	Fokker	Netherlands	50	6,500,000
F-50 4/	Fokker	Netherlands	50	7,300,000
Dash 7	DeHavilland	Canada	50	8,000,000
YS-11 1/	Nihon	Japan	60	2/
ATP 4/	British Aerospace	United Kingdom	64	8,800,000
ATR72 4/	Aerospatiale/	France/Italy Aeritalia	66	8,650,000
146-100	British Aerospace	United Kingdom	82	14,500,000
F-28	Fokker	Netherlands	85	11,000,000
F-100 4/	Fokker	Netherlands	85	14,900,000
146-200	British Aerospace	United Kingdom	100	15,900,000

1/ No longer in production.
2/ Not available.
3/ As of Nov. 1, 1985, Fairchild Aircraft Corp. became only a subcontractor to Saab Scania for the SF340 program for the first 108 aircraft. At that point Saab Scania will take over all production responsibilities.
4/ Not yet delivered.

Source: 1985 Annual Report of the Regional Airline Association, Regional Airline Association, May 1985.

Aircraft	Company	Country	Class	Seating 1/	Number and type of engines)	1985 Price in current U.S. dollars)
201	Mooney	United States	small	4	1 piston	$112,040
231	Mooney	United States	small	4	1 piston	121,040
Malibu	Piper	United States	small	5	1 piston	317,670
P166DL3	Piaggio	Italy	small	5	2 turboprop	1,280,000
Aerostar	Piper	United States	small	5	2 piston	558,635
Avanti 2/	Gates/Piaggio	United States/ Italy 3/	small	6	2 pusher turboprop	2,695,000
Cheyenne I	Piper	United States	small	6	2 turboprop	1,123,490
Conquest I	Cessna	United States	small	6	2 turboprop	1,245,000
Citation I 4/	Cessna	United States	small	6	2 jet	2,192,400
King Air (various models)	Beech	United States	small	6	2 turboprop	1,321,370 -2,528,180
Learjet 36	Gates	United States	small	6	2 jet	4,100,000
Falcon 10 4/	Dassault	France	small	6	2 jet	4,350,000
Avtek 400 2/	Avtek	United States	small	6	2 jet	1,750,000
Laser 300 2/	QMAC	United States	small	5/	2 turboprop	750,000
Falcon 100	Dassault	France	small	8	2 jet	3,970,000
Chieftan	Piper	United States	small	7	2 piston	561,595
Solitaire 6/	Mitsubishi	Japan 7/	small	7	2 turboprop	1,325,000
Citation II	Cessna	United States	small	7	2 jet	2,960,000
Learjet 25 (various models)	Gates	United States	small	7	2 jet	2,367,485 -2,700,000
Learjet 35	Gates	United States	small	7	2 jet	2,850,000
Spartacus	Aeritalia/ Partenavia	Italy	small	7	2 turboprop	608,500
Diamond I 6/	Mitsubishi	Japan 7/	small	7	2 jet	2,938,125
Diamond II 8/	Mitsubishi	Japan 7/	small	7	2 jet	3,190,000
Diamond III 9/	Mitsubishi	Japan 7/	small	5/	2 jet	5/
Citation III	Cessna	United States	small	7	2 jet	5,950,000
Learjet 55 (various models)	Gates	United States	small	7	2 jet	4,495,000 -5,940,000
Xingu II 10/	Embraer	Brazil	small	7	2 turboprop	2,100,000
Westwind I	Israel Aircraft Industries	Israel	medium	7	2 jet	3,700,000
Westwind II	Israel Aircraft Industries	Israel	medium	7	2 jet	4,349,000
Astra 2/	Israel Aircraft Industries	Israel	medium	6-9	2 jet	5,495,000
Cheyenne II	Piper	United States	small	7	2 jet	1,537,930
Bandeirante	Embraer	Brazil	small	8	2 turboprop	1,950,000
Starship 2/	Beech	United States	small	8	2 pusher turboprop	3,500,000
BN2-T	Pilatus Britten-Norman	United Kingdom	small	8	2 turboprop	630,000
Viator	Aeritalia	Italy	small	9	2 turboprop	5/
Falcon 20	Dassault	France	medium	8	2 jet	7,500,000
Cheyenne 400LS	Piper	United States	small	8	2 turboprop	2,375,000

Aircraft	Company	Country	Class	Seating 1/	Number and type of engines)	1985 Price in current U.S. dollars)
BA 125-700 4/	British Aero-space	United Kingdom	medium	8	2 jet	5/
BA 125-800	British Aero-space	United Kingdom	medium	8	2 jet	6,700,000
Marquis 6/	Mitsubishi	Japan 7/	small	8	2 turboprop	1,790,000
Cheyenne IV	Piper	United States	small	8	2 turboprop	2,153,223
Falcon 20	Dassault	France	medium	9	2 jet	6,188,790
Merlin (various models)	Fairchild	United States	small	9	2 turboprop	2,179,665- 2,750,000
Fairchild 300	Fairchild	United States	small	9	2 turboprop	5/
Fairchild 300	Fairchild	United States	small	9	2 turboprop	1,979,000
Jetstream 31 (corp.)	British Aerospace	United Kingdom	small	9	2 turboprop	2,600,000
Lear Fan 2/	Lear Fan	United Kingdom	small	9	2 pusher turboprop	2,300,000
Conquest II	Cessna	United States	small	9	2 turboprop	1,759,000
SF 340 (corp.)	Saab/Fairchild	Sweden/United States	medium	5/	2 turboprop	6,250,000
Dash 8 (corp.)	DeHavilland	Canada	medium	5/	2 turboprop	5/
Brasilia (corp.)	Embraer	Brazil	medium	5/	2 turboprop	5/
Sabreliner 4/	Rockwell	United States	medium	5/	2 jet	5/
Commander 4/ (various models)	Gulfstream	United States	medium	10	2 turboprop	1,416,000- 1,777,750
Falcon 50	Dassault	France	large	10	3 jet	10,950,000
Challenger 600	Canadair	Canada	large	10	2 jet	10,100,000
Challenger 601	Canadair	Canada	large	10	2 jet	11,600,000
Falcon 900 2/	Dassault	France	large	12	2 jet	14,500,000
G-III	Gulfstream	United States	large	14	2 jet	14,195,000
G-IV 2/	Gulfstream	United States	large	14	2 jet	15,000,000
Exec-Liner	Beech	United States	small	15	2 turboprop	5/

1/ Seating capacity may vary significantly due to differing aircraft interior configurations.
2/ Aircraft not yet delivered.
3/ In January 1986 Gates Learjet Corp. announced that the firm was withdrawing from the Avanti program.
4/ Aircraft no longer produced.
5/ Data is not currently available.
6/ Production ceased on these aircraft in December 1985 due to the purchase of the firm by Beech Aircraft Corp.
7/ These aircraft were assembled in the United States.
8/ Beech Aircraft Corp. purchased the Diamond II program from Mitsubishi Aircraft International in early December 1985, renaming the plane the Beechjet.
9/ This aircraft will not likely be produced because of the purchase of Mitsubishi Aircraft International's operations by Beech Aircraft Corp.
10/ This aircraft is not sold in the United States.

Source: 1985 Planning and Purchasing Handbook, Business and Commercial Aviation, April 1985.

APPENDIX D

THE MARKETING, PURCHASING PROCESS, AND FINANCING OF COMMUTER AND BUSINESS AIRCRAFT PURCHASES

Marketing

Commuter aircraft.--Commuter aircraft are marketed in the United States basically in the same fashion, regardless of manufacturer. Initially, attempts to generate interest in the aircraft are made through articles and advertisements in trade journals. Additionally, a detailed sales campaign is launched that includes soliciting new purchasers and attempting to sell aircraft to purchasers that have already expressed interest in the product. When a manufacturer is attempting to solicit business for a new or existing airplane, the sales representative will visit the airline and stress the virtues of the producing company, its reputation in the industry, the airplanes it is currently producing, and any future models. After the presentation is made, the salesperson attempts to collect information on the routes served by the airline, the frequency of these routes, and the airlines's cost factors. The data obtained is carefully evaluated and a detailed economic analysis is done. Typically, the sales representative will then make an appointment for a followup conference to present the analysis or will advise the prospective client that the report will be sent as soon as it is prepared. The route analysis is one of the most important sales' tools used by commuter aircraft manufacturers. This report generally contains information on the direct costs of operating the company's aircraft over the airline's route structure. In some cases, the report also contains available statistics on competing aircraft. From this analysis, the salesperson attempts to convince the carrier that the company's aircraft are best suited to the airline's present and future needs.

When an airline has directly contracted the company or has expressed its interest by filling out an "interest card" in a trade publication, a similar sales procedure is followed. However, under these circumstances, the manufacturer is usually able to prepare a route and economic analysis prior to the initial sales contact by soliciting the necessary information by telephone. Additionally, the sales representative is able to focus the presentation on the specific plane in which the airline has expressed interest. In both the soliciting of new business and the marketing of aircraft to interested purchasers, a direct mail program is instituted after the sales' presentation is made. The potential purchasers are typically sent brochures, specifications, and press releases on a weekly or biweekly basis.

Business aircraft.--The way business aircraft are marketed in the United States differs somewhat according to manufacturer and type of aircraft. Initial attempts to generate interest in the product, however, are made in the same way as discussed earlier for commuter airplanes, i.e., through articles and advertisements in trade journals. Producers also have marketing offices that maintain continuing contact with medium- and large-sized companies that are both past and potential purchasers of their aircraft. The point of contact, in the majority of these cases, is the aviation or flight department. When dealing with most medium- and large-sized corporations outside the United States, the marketing process is very similar to that followed in the United States. However, in many other areas, especially developing nations, the purchase of a business aircraft is a personal, rather than business, decision. The sales representatives must then develop a relationship with the potential purchaser before the actual selling process can begin. Often, it

will take 2 years to make an aircraft sale in those countries. Conventions and industry trade shows also provide manufacturers the opportunity to contact potential purchasers in the United States and abroad.

Several manufacturers of smaller business aircraft, however, sell their planes through dealer/distributor networks and not directly from the factory. In recent years, many of these manufacturers have moved to restructure their dealer sales' organizations and have, in fact, decreased the number of their distributorships. 1/ Industry sources indicate that manufacturers are attempting to establish fewer, but more financially secure, dealers for more flexibility in view of the decrease in overall general aviation sales. 2/

Purchasing Process

Commuter aircraft.--In the past few years, the equipment selection process utilized by the commuter airline industry has increased in sophistication. This change has translated into a more structured approach to the purchasing of their aircraft. Initially, commuter airlines often lacked the resources and/or experience needed to make a methodical and analytical buying decision. Frequently, these airlines' purchasing decisions were based on the preferences of the airline owner or the type of equipment already operated. 3/ This is still the way the decisions are made in some of the small, regional airlines. For the majority of the carriers of substantial size and/or financial stability, the flight equipment investment decision process has become a structured, complex process. Since the airplane is the ultimate source of revenue for the airline, the choice of equipment is critical to the success or failure of the carrier. Industry sources estimate that equipment expense represents approximately 25 to 30 percent of the overall operating costs of the typical commuter airline.

The purchasing process for a new airline, or one seeking to expand, begins after an examination of the potential fares and passenger loads on the proposed route. Through this analysis, the carrier will make an estimate of the size airplane it requires. The airline has several equipment options including used aircraft, new aircraft of existing models, new derivatives of existing models, and new-generation aircraft incorporating the most modern technology. An airline will than collect as much information as possible on all of the airplanes which it considers likely prospects. In general, air carriers keep abreast of developments in the aircraft industry and product availability. However, it is at this point that data are gathered in the form of "type specifications," which are documents prepared by the manufacturer detailing the design and operational performance characteristics of the plane. Sometimes, the staff will evaluate the aircraft to verify the manufacturers'

1/ Commission staff interviews with officials of the U.S. commuter and business aircraft industry.

2/ "Manufacturers Restructure Sales Organizations in Depressed Market," Aviation Week and Space Technology, Nov. 19, 1984, p. 88.

3/ Commission staff interviews with industry executives of the U.S. commuter airline industry.

claims by talking to current operators of the plane. The airline will receive detailed sales' presentations from the producers, including the price, delivery date, and financing available for the aircraft. With this information in hand, the elimination process begins, and the "short list" (list of likely airplanes) is narrowed down to one or two, with a staff recommendation being made. In many commuter airlines, the chief executive will then decide on the aircraft model and then negotiate final contractual terms. In other airlines, being large in size or publicly owned, the option selected would also have to be approved by the board of directors.

Initial cost is far from the only factor considered in the decision-making process. Airlines are examining maintenance and fuel costs, as well as the resale value of the plane. For example, a piston aircraft is relatively inexpensive to purchase, but utilizes increasingly scarce and expensive aviation gasoline and has low resale value. A turboprop airplane is much more expensive to acquire, but requires less frequent engine overhaul and retains it value better. In commuter airlines, this selection process most frequently translates into a comparison of the average seat-mile cost of differing aircraft. This analysis takes into account the speed and fuel burn of the airplane, as well as the stage length and frequency of the airlines operations. 1/

Business aircraft.--During the past 10 years, the appreciation of the company airplane as a necessary and productivity-raising capital investment has increased. Industry advocates state that business aircraft are typically purchased with a firm's profits in order to further enhance profits. However, companies often still must systematically document their need for the airplane, especially in light of worker wage concessions and lower stock earnings. Therefore, the decision process that a business engages in has become, by necessity, increasingly sophisticated and structured.

Through an examination of the amount of travel its employees undertake, (both to and from company plants and subsidiaries, and/or for marketing purposes) and factoring in the more efficient utilization of time and increased security an airplane affords, a firm will come to the realization that it does need a business aircraft. Industry sources indicate that many companies regard 600 flying hours a year as the minimum use needed to justify the purchase of a plane. The acquisition decision itself usually involves a detailed analysis of startup costs, as well as estimated operating costs and tax benefits. In larger corporations, this analysis can include extensive data gathering on both the fixed and variable costs of establishing a flight department. Fixed costs include such items as aircraft acquisition, tax considerations, pilots'/maintenance personnel salaries, aircraft storage, insurance, and operational services; variable costs take into account those costs associated with the airplane's actual operation, such as fuel, maintenance, and landing fees. 2/ Traditionally, a business considered only cost/weight, cost/range, and cost/payload in their analysis. 3/ The evaluations translated into a similar "bottom line" comparison for business aircraft as seat-mile cost offers regional airlines. In medium- and large-

1/ J.M. Ramsden, "Which Commuterliner?," Flight International, Sept. 1, 1984, p. 411.

2/ "Costing Business Aircraft," Business and Commerical Aviation, August 1984, pp. 48-64.

3/ Marc Grangier, "Business Jets in Focus," The World of Business Aviation--Interavia, August 1985, pp. 14-17

size corporations, however, with existing flight departments, the recommendations of the chief pilot and aviation department personnel are taken into consideration by the chief executive and purchasing office in deciding on which plane to acquire.

The Financing of Aircraft Purchases

Once the decision has been made on which aircraft to acquire, the issue of financing comes into play. The first decision to be made is whether the plane should be purchased or leased. This evaluation entails a detailed financial analysis of the discounted present value of projected cash flows and the associated tax impacts. Other critical variables to be considered include the assumed life and residual value of the plane, the ability to utilize tax beneifts, the ability to finance the purchase, and the interest rate involved. 1/

If the decision is made to purchase the aircraft, financing must often be considered. Financing has been called the most serious problem facing civil aviation today. 2/ Financing is primarily a function of the value of the transaction and the creditworthiness of the purchaser. If the purchaser is a commuter airline, the financing issue is particularly important. These airlines generally do not have sufficient accumulated profits to devote to new equipment. U.S. airlines are heavily leveraged and often unable to take on additional debt. The resources needed to pay for the plane will be derived from the operation of the aircraft. Interest expenses are a very major cost in the capital-intensive airline business. Business aircraft purchasers vary from those able to pay in full for the aircraft to those requiring financing similar to commuter airlines. The conditions of financing must necessarily reflect these differing cash flow postions. 3/

As stated earlier, financing is generally more important to commuter airlines than to business aircraft purchasers. This section, therefore, deals more with commuter airliner financing. During 1979-81, purchasers generally obtained financing from private sources, such as commercial banks. However, many banks were reluctant to lend money to commuter airlines and some businesses because of poor financial performance. High interest rates also discouraged credit financing. Therefore, there was a move toward financing through shareholder equity, public debt, leasing, and manufacturer-sponsored programs. In spite of the increased usage of these differing financing avenues, purchasers continued to rely heavily on bank financing.

Industry sources note that the emergence of manufacturer-sponsored financing is another response to the intense competition in this market. Several foreign and domestic manufacturers have set up specific financing subsidiaries. Also these producers have been forced to become responsible for remarketing and/or refurbishing the aircraft and absorbing other risks should

---

1/ Stuart M. Warren, "In Acquiring New Aircraft, Should You Buy or Lease?," Commuter Air, September 1985, pp. 50-55.

2/ "Aircraft Financing Today's Top Problem," Commuter Air, April 1985, p. 6.

3/ Speech by Stephanie Daillencourt, Sales Financing Manager, Aerospatiate Corp., at the Air Finance Journal Conference, Nov. 14, 1984.

the purchaser default on their repayment of the loan. However, as the backlog of U.S. manufacturers has increased and their cash structure tightened, the availability of this type of financing has diminished. 1/

There are three U.S. Government programs available to assist U.S. purchasers of commuter aircraft. These programs are, however, geared toward purchasers who utilize the aircraft as a revenue-generating product. The first program, the FAA Loan Guarantee Program, began in 1978 and allowed commuter airlines to purchase equipment with U.S. Government guarantees. Under this program, the airline must pay a downpayment (usually 10 percent), and the FAA will then guarantee 90 percent of the remainder of the loan for either domestically or foreign-built aircraft. During fiscal years 1979-81, the number of guarantees approved totaled 34, valued at slightly over $87 million. The number of approvals declined in the following years as the program had several carriers default on loans. This program, however, expired on October 23, 1983. 2/

Another source of guarantees used is the Business & Industry Loan Program administered by the Farmers Home Administration (FmHA) of the U.S. Department of Agriculture. Its objective is to provide assistance to industries in communities with less than 50,000 persons. The most common assistance is the guarantee program, which can assure up to 90 percent of an equipment loan. This source of guarantees, according to regional airline sources, was used very little during 1980-84. Finally, the Small Business Administration has a guarantee program similar to the FmHA program. However, this warranty is almost never used by purchasers of commuter or business aircraft, as the maximum industrial loan guarantee is $500,000.

There are important benefits obtained by purchasing a commuter or business airplane. The most basic advantage is that the purchaser owns the asset and continually builds up equity. There are also significant tax benefits in ownership. Further, industry sources indicate that the initial cash outlay and monthly payment can be greatly lessened because of the attractive financing packages offered by equipment manufacturers. Currently, because of the advent of new aircraft with unproven technologies, many manufacturers have been forced to make substantial concessions to induce purchasers to commit to these large expenditures. 3/

Regarding leasing, industry analysts note that there are two basic types of leases involved in the aircraft industry--a full pay-out lease and an operating lease. A full pay-out lease is generally an agreement of an airline or business to operate the aircraft for a period approaching the useful life of the plane, allowing the lessor to recoup the full cost of the aircraft plus a reasonable return on his investment. An operating lease is usually for a shorter term and often allows the lease to be a non-balance-sheet item. Generally, both types of leases mandate that the aircraft's operation must be lawful, that all taxes and operational expenses be paid, and that it must be

---

1/ Data provided by Gerald Bernstein, from the Third International Workshop on the Future of Aviation, Transportation Research Board, Oct. 10, 1985.

2/ Data provided by the Federal Aviation Administration, August 1985.

3/ "Superprops May Liven Depressed Market," High Technology, October 1984, p. 85.

properly maintained. Normally, leasing agreements are for 5 to 8 years for turboprop aircraft or 8 to 10 years for jet airplanes. 1/ The lease may specify a return condition of the airplane or include an option to purchase the equipment. 2/

Leasing an aircraft has several significant advantages; one of the most important being the preservation of available capital. Typically, an operator must supply a downpayment of 10 to 25 percent of the aircraft's price, and be able to finance the remainder. In a lease arrangement, only the payment of the monthly rental fee must be made. Leasing can often be more flexible, allowing a shorter utilization period and/or longer term payments. Leasing also has the advantage of being a hedge against inflation. 3/

Traditionally, the regional airline industry has been purchase, rather than lease, oriented because of the "entrepenurial spirit" of initial managers. However, this has changed in recent years owing in large part to the high price of aircraft. Data obtained from commuter airlines responding to the Commission's questionnaire confirmed this strong preference for leasing their equipment. These operators are very sensitive to their monthly cash flow, requiring that the revenue from airline tickets more than offset the cost of operation. 4/ Industry officials noted that high interest rates have also lessened the desirability of purchasing aircraft. However, seller financing was also noted as a major source of financing for the U.S. commuter airline industry. Most foreign and domestic producers of commuter aircraft offer financing for their equipment. Foreign export credit agencies were also indicated as offering loans at below-market interest rates and loan guarantees to reduce purchasers' costs.

Purchasers of business aircraft indicated in their response to the Commission's questionnaire an overwhelming preference for purchasing, rather than leasing, of their aircraft. Financial analysts in the aerospace industry confirm this finding, attributing this to a corporate mentality of acquiring assets, and the fact that the aircraft is ancillary to their main business and they do not have to show a profit on its operation. 5/

Generally, purchasers of business aircraft indicated that the aircraft were paid for with internal funds. Smaller businesses indicated the importance of bank loans and seller financing. However, several questionnaire respondents indicated their interest in leasing business aircraft, citing the flexability leasing offered as well as the fact that it does not appear on the corporate balance sheet. Although industrywide statistics are not available, it is estimated that less than 30 percent of the small, business jet acquisitions are leased. 6/

1/ Marc Grangier, "Should You Buy or Lease Your Aircraft," Interavia, August 1984, p. 799.

2/ Stuart M. Warren, "In Acquiring New Aircraft, Should You Buy or Lease," Commuter Air, September 1985, pp. 50-55.

3/ Ibid.

4/ Paul Mann, "Analyst Predict That Aircraft Leasing Will Not Supplant Ownership," Aviation Week & Space Technology, Sept. 23, 1985, pp. 62-63.

5/ Commission staff discussions with industry officials, June 1985.

6/ Paul Mann, "Analysts Predict That Aircraft Leasing Will Not Supplant Ownership," Aviation Week & Space Technology, Sept. 23, 1985, pp. 62-63.

Once a purchase decision is made, the purchasers' commitment may begin at one of three levels: the letter of intent to purchase; an option to buy; or a firm order. A letter of intent is usually a nonbinding agreement between the buyer and the seller, and as the name implies, it is nothing more than a preliminary statement of the buyer's interest in the aircraft. The letter of intent is often more important to the airplane's manufacturer than to the purchaser if that producer must convince its financial backers that a market for the plane exists. In an option to buy, the purchase agreement has not been completely finalized and the parties are not fully committed to the sale. The option may provide the buyer with a commitment from the aircraft vendor that the plane's base price will be fixed for a certain period of time. Often, commuter or business airplane buyers will purchase an aircraft and receive options to buy additional planes. A firm order is placed when the buyer signs a purchase agreement detailing the duties of each party with respect to price, delivery, and acceptance of the aircraft. A firm order generally requires the purchaser to make a nonrefundable downpayment--usually 10 to 15 percent of the price of the aircraft. However, sources in the commuter and business aircraft manufacturing industry suggest that, given the current market conditions, the downpayment requirement is not always imposed.

APPENDIX E

THE CIVIL AIRCRAFT AGREEMENT

AGREEMENT ON TRADE IN CIVIL AIRCRAFT

INCLUDING THE THIRD CERTIFICATION
OF MODIFICATIONS AND RECTIFICATIONS
TO THE ANNEX TO THE AGREEMENT
OF 1 JANUARY 1985

Recognizing the need to provide for international notification, consultation, surveillance and dispute settlement procedures with a view to ensuring a fair, prompt and effective enforcement of the provisions of this Agreement and to maintain the balance of rights and obligations among them;

Desiring to establish an international framework governing conduct of trade in civil aircraft;

Hereby agree as follows:

Article 1

Product Coverage

1.1 This Agreement applies to the following products:

(*a*) all civil aircraft,

(*b*) all civil aircraft engines and their parts and components,

(*c*) all other parts, components, and sub-assemblies of civil aircraft,

(*d*) all ground flight simulators and their parts and components,

whether used as original or replacement equipment in the manufacture, repair, maintenance, rebuilding, modification or conversion of civil aircraft.

1.2 For the purposes of this Agreement "civil aircraft" means (*a*) all aircraft other than military aircraft and (*b*) all other products set out in Article 1.1 above.

Article 2

Customs Duties and Other Charges

2.1 Signatories agree:

2.1.1 to eliminate by 1 January 1980, or by the date of entry into force of this Agreement, all customs duties and other charges * of any kind levied on, or in connexion with, the importation of products, classified for customs purposes under their respective tariff headings listed in the Annex, if such products are for use in a civil aircraft and incorporation therein, in the course of its manufacture, repair, maintenance, rebuilding, modification or conversion;

* "Other charges" shall have the same meaning as in Article II of the GATT.

AGREEMENT ON TRADE IN CIVIL AIRCRAFT

PREAMBLE

Signatories* to the Agreement on Trade in Civil Aircraft, hereinafter referred to as " this Agreement ";

Noting that Ministers on 12-14 September 1973 agreed the Tokyo Round of Multilateral Trade Negotiations should achieve the expansion and ever-greater liberalization of world trade through, *inter alia*, the progressive dismantling of obstacles to trade and the improvement of the international framework for the conduct of world trade;

Desiring to achieve maximum freedom of world trade in civil aircraft, parts and related equipment, including elimination of duties, and to the fullest extent possible, the reduction or elimination of trade restricting or distorting effects;

Desiring to encourage the continued technological development of the aeronautical industry on a world-wide basis;

Desiring to provide fair and equal competitive opportunities for their civil aircraft activities and for their producers to participate in the expansion of the world civil aircraft market;

Being mindful of the importance in the civil aircraft sector of their overall mutual economic and trade interests;

Recognizing that many Signatories view the aircraft sector as a particularly important component of economic and industrial policy;

Seeking to eliminate adverse effects on trade in civil aircraft resulting from governmental support in civil aircraft development, production, and marketing while recognizing that such governmental support, of itself, would not be deemed a distortion of trade;

Desiring that their civil aircraft activities operate on a commercially competitive basis, and recognizing that government-industry relationships differ widely among them;

Recognizing their obligations and rights under the General Agreement on Tariffs and Trade, hereinafter referred to as " the GATT ", and under other multilateral agreements negotiated under the auspices of the GATT;

---

* The term " Signatories " is hereinafter used to mean Parties to this Agreement.

2.1.2 to eliminate by 1 January 1980, or by the date of entry into force of this Agreement, all customs duties and other charges * of any kind levied on repairs on civil aircraft;

2.1.3 to incorporate in their respective GATT Schedules by 1 January 1980, or by the date of entry into force of this Agreement, duty-free or duty-exempt treatment for all products covered by Article 2.1.1 above and for all repairs covered by Article 2.1.2 above.

2.2 Each Signatory shall: (*a*) adopt or adapt an end-use system of customs administration to give effect to its obligations under Article 2.1 above; (*b*) ensure that its end-use system provides duty-free or duty-exempt treatment that is comparable to the treatment provided by other Signatories and is not an impediment to trade; and (*c*) inform other Signatories of its procedures for administering the end-use system.

Article 3

Technical Barriers to Trade

3.1 Signatories note that the provisions of the Agreement on Technical Barriers to Trade apply to trade in civil aircraft. In addition, Signatories agree that civil aircraft certification requirements and specifications on operating and maintenance procedures shall be governed, as between Signatories, by the provisions of the Agreement on Technical Barriers to Trade.

Article 4

Government-Directed Procurement, Mandatory Sub-Contracts and Inducements

4.1 Purchasers of civil aircraft should be free to select suppliers on the basis of commercial and technological factors.

4.2 Signatories shall not require airlines, aircraft manufacturers, or other entities engaged in the purchase of civil aircraft, nor exert unreasonable pressure on them, to procure civil aircraft from any particular source, which would create discrimination against suppliers from any Signatory.

* " Other charges " shall have the same meaning as in Article II of the GATT.

4.3 . Signatories agree that the purchase of products covered by this Agreement should be made only on a competitive price, quality and delivery basis. In conjunction with the approval or awarding of procurement contracts for products covered by this Agreement a Signatory may, however, require that its qualified firms be provided with access to business opportunities on a competitive basis and on terms no less favourable than those available to the qualified firms of other Signatories. *

4.4 Signatories agree to avoid attaching inducements of any kind to the sale or purchase of civil aircraft from any particular source which would create discrimination against suppliers from any Signatory.

Article 5

Trade Restrictions

5.1 Signatories shall not apply quantitative restrictions (import quotas) or import licensing requirements to restrict imports of civil aircraft in a manner inconsistent with applicable provisions of the GATT. This does not preclude import monitoring or licensing systems consistent with the GATT.

5.2 Signatories shall not apply quantitative restrictions or export licensing or other similar requirements to restrict, for commercial or competitive reasons, exports of civil aircraft to other Signatories in a manner inconsistent with applicable provisions of the GATT.

Article 6

Government Support, Export Credits, and Aircraft Marketing

6.1 Signatories note that the provisions of the Agreement on Interpretation and Application of Articles VI, XVI and XXIII of the General Agreement on Tariffs and Trade (Agreement on Subsidies and Countervailing Measures) apply to trade in civil aircraft. They affirm that in their participation in, or support of, civil aircraft programmes they shall seek to avoid adverse

* Use of the phrase " access to business opportunities . . . on terms no less favourable . . . " does not mean that the amount of contracts awarded to the qualified firms of one Signatory entitles the qualified firms of other Signatories to contracts of a similar amount.

effects on trade in civil aircraft in the sense of Articles 8.3 and 8.4 of the Agreement on Subsidies and Countervailing Measures. They also shall take into account the special factors which apply in the aircraft sector, in particular the widespread governmental support in this area, their international economic interests, and the desire of producers of all Signatories to participate in the expansion of the world civil aircraft market.

6.2 Signatories agree that pricing of civil aircraft should be based on a reasonable expectation of recoupment of all costs, including non-recurring programme costs, identifiable and pro-rated costs of military research and development on aircraft, components, and systems that are subsequently applied to the production of such civil aircraft, average production costs, and financial costs.

Article 7

Regional and Local Governments

7.1 In addition to their other obligations under this Agreement, Signatories agree not to require or encourage, directly or indirectly, regional and local governments and authorities, non-governmental bodies, and other bodies to take action inconsistent with provisions of this Agreement.

Article 8

Surveillance, Review, Consultation, and Dispute Settlement

8.1 There shall be established a Committee on Trade in Civil Aircraft (hereinafter referred to as " the Committee ") composed of representatives of all Signatories. The Committee shall elect its own Chairman. It shall meet as necessary, but not less than once a year, for the purpose of affording Signatories the opportunity to consult on any matters relating to the operation of this Agreement, including developments in the civil aircraft industry, to determine whether amendments are required to ensure continuance of free and undistorted trade, to examine any matter for which it has not been possible to find a satisfactory solution through bilateral consultations, and to carry out such responsibilities as are assigned to it under this Agreement, or by the Signatories.

8.2 The Committee shall review annually the implementation and operation of this Agreement taking into account the objectives thereof. The

Committee shall annually inform the CONTRACTING PARTIES to the GATT of developments during the period covered by such review.

8.3 Not later than the end of the third year from the entry into force of this Agreement and periodically thereafter, Signatories shall undertake further negotiations, with a view to broadening and improving this Agreement on the basis of mutual reciprocity.

8.4 The Committee may establish such subsidiary bodies as may be appropriate to keep under regular review the application of this Agreement to ensure a continuing balance of mutual advantages. In particular, it shall establish an appropriate subsidiary body in order to ensure a continuing balance of mutual advantages, reciprocity and equivalent results with regard to the implementation of the provisions of Article 2 above related to product coverage, the end-use systems, customs duties and other charges.

8.5 Each Signatory shall afford sympathetic consideration to and adequate opportunity for prompt consultation regarding representations made by another Signatory with respect to any matter affecting the operation of this Agreement.

8.6 Signatories recognize the desirability of consultations with other Signatories in the Committee in order to seek a mutually acceptable solution prior to the initiation of an investigation to determine the existence, degree and effect of any alleged subsidy. In those exceptional circumstances in which no consultations occur before such domestic procedures are initiated, Signatories shall notify the Committee immediately of initiation of such procedures and enter into simultaneous consultations to seek a mutually agreed solution that would obviate the need for countervailing measures.

8.7 Should a Signatory consider that its trade interests in civil aircraft manufacture, repair, maintenance, rebuilding, modification or conversion have been or are likely to be adversely affected by any action by another Signatory, it may request review of the matter by the Committee. Upon such a request, the Committee shall convene within thirty days and shall review the matter as quickly as possible with a view to resolving the issues involved as promptly as possible and in particular prior to final resolution of these issues elsewhere. In this connexion the Committee may issue such rulings or recommendations as may be appropriate. Such review shall be without prejudice to the rights of Signatories under the GATT or under instruments multilaterally negotiated under the auspices of the GATT, as they affect trade in civil aircraft. For the purposes of aiding consideration of the issues involved, under the GATT and such instruments, the Committee may provide such technical assistance as may be appropriate.

8.8 Signatories agree that, with respect to any dispute related to a matter covered by this Agreement, but not covered by other instruments multi-

laterally negotiated under the auspices of the GATT, the provisions of Articles XXII and XXIII of the General Agreement and the provisions of the Understanding related to Notification, Consultation, Dispute Settlement and Surveillance shall be applied, *mutatis mutandis*, by the Signatories and the Committee for the purposes of seeking settlement of such dispute. These procedures shall also be applied for the settlement of any dispute related to a matter covered by this Agreement and by another instrument multilaterally negotiated under the auspices of the GATT, should the parties to the dispute so agree.

Article 9

Final Provisions

9.1 *Acceptance and Accession*

9.1.1 This Agreement shall be open for acceptance by signature or otherwise by governments contracting parties to the GATT and by the European Economic Community.

9.1.2 This Agreement shall be open for acceptance by signature or otherwise by governments having provisionally acceded to the GATT, on terms related to the effective application of rights and obligations under this Agreement, which take into account rights and obligations in the instruments providing for their provisional accession.

9.1.3 This Agreement shall be open to accession by any other government on terms, related to the effective application of rights and obligations under this Agreement, to be agreed between that government and the Signatories, by the deposit with the Director-General to the CONTRACTING PARTIES to the GATT of an instrument of accession which states the terms so agreed.

9.1.4 In regard to acceptance, the provisions of Article XXVI: 5(*a*) and (*b*) of the General Agreement would be applicable.

9.2 *Reservations*

9.2.1 Reservations may not be entered in respect of any of the provisions of this Agreement without the consent of the other Signatories.

9.3 *Entry into Force*

9.3.1 This Agreement shall enter into force on 1 January 1980 for the governments* which have accepted or acceded to it by that date.

* For the purpose of this Agreement, the term " government " is deemed to include the competent authorities of the European Economic Community.

For each other government it shall enter into force on the thirtieth day following the date of its acceptance or accession to this Agreement.

9.4 *National Legislation*

9.4.1 Each government accepting or acceding to this Agreement shall ensure, not later than the date of entry into force of this Agreement for it, the conformity of its laws, regulations and Administrative procedures with the provisions of this Agreement.

9.4.2 Each Signatory shall inform the Committee of any changes in its laws and regulations relevant to this Agreement and in the administration of such laws and regulations.

9.5 *Amendments*

9.5.1 The Signatories may amend this Agreement, having regard, *inter alia*, to the experience gained in its implementation. Such an amendment, once the Signatories have concurred in accordance with the procedures established by the Committee, shall not come into force for any Signatory until it has been accepted by such Signatory.

9.6 *Withdrawal*

9.6.1 Any Signatory may withdraw from this Agreement. The withdrawal shall take effect upon the expiration of twelve months from the day on which written notice of withdrawal is received by the Director-General to the CONTRACTING PARTIES to the GATT. Any Signatory may upon such notification request an immediate meeting of the Committee.

9.7 *Non-Application of this Agreement Between Particular Signatories*

9.7.1 This Agreement shall not apply as between any two Signatories if either of the Signatories, at the time either accepts or accedes to this Agreement, does not consent to such application.

9.8 *Annex*

9.8.1 The Annex to this Agreement forms an integral part thereof.

9.9 *Secretariat*

9.9.1 This Agreement shall be serviced by the GATT secretariat.

9.10 *Deposit*

9.10.1 This Agreement shall be deposited with the Director-General to the CONTRACTING PARTIES to the GATT who shall promptly

furnish to each Signatory and each contracting party to the GATT a certified copy thereof and of each amendment thereto pursuant to Article 9.5 and a notification of each acceptance thereof or accession thereto pursuant to Article 9.1, or each withdrawal therefrom pursuant to Article 9.6.

9.11 *Registration*

9.11.1 This Agreement shall be registered in accordance with the provisions of Article 102 of the Charter of the United Nations.

Done at Geneva this twelfth day of April nineteen hundred and seventy-nine in a single copy, in the English and French languages, each text being authentic, except as otherwise specified with respect to the various lists in the Annex.

ANNEX

PRODUCT COVERAGE

Signatories agree that products classified for customs purposes under their respective tariff headings listed below shall be accorded duty-free or duty-exempt treatment, if such products are for use in a civil aircraft and incorporation therein, in the course of its manufacture, repair, maintenance, rebuilding, modification or conversion.

These products shall not include:

— an incomplete or unfinished product, unless it has the essential characteristics of a complete or finished civil aircraft part, component, subassembly or item of equipment. *

— materials in any form (e.g., sheets, plates, profile shapes, strips, bars, pipes, tubes, or other shapes) unless they have been cut to size or shape or shaped for incorporation in civil aircraft. *

— raw materials and consumable goods.

* E.g., an article which has a civil aircraft manufacturer's parts number.

ANNEX

LIST OF ITEMS FROM THE TARIFF SCHEDULES OF THE UNITED STATES

The following list is authentic only in the English language.

TSUS	Description
518.52	Articles NSPF, of asbestos, if certified for use in civil aircraft.
544.43	Windshields, if certified for use in civil aircraft.
642.22	Strands, ropes, cables, and cordage, all the foregoing, of wire, fitted with fittings, or made up into articles, if certified for use in civil aircraft.
647.04	Hinges and fittings and mountings, NSPF, not coated or plated with precious metal; all the foregoing of iron or steel, or aluminium, or zinc, if certified for use in civil aircraft.
647.07	Hinges and fittings and mountings, NSPF, not coated or plated with precious metal, of base metal other than iron, steel, aluminium or zinc, if certified for use in civil aircraft.
652.11	Flexible metal hose or tubing, with fittings, if certified for use in civil aircraft.
653.41	Illuminating articles and parts thereof, of base metal, if certified for use in civil aircraft.
653.98	Toilet and sanitary ware, if certified for use in civil aircraft.
660.58	Internal-combustion engines, piston-type, other than compression-ignition engines, if certified for use in civil aircraft.
660.61	Non-piston type internal combustion engines, if certified for use in civil aircraft.
660.69	Parts of piston-type engines other than compression-ignition engines, if certified for use in civil aircraft.
660.73	Parts of non-piston type engines or compression-ignition, piston-type engines, if certified for use in civil aircraft.
660.87	Non-electric engines and motors, NSPF, if certified for use in civil aircraft.
660.99	Pumps for liquids, operated by any kind of power unit, if certified for use in civil aircraft.

661.08 Fans and blowers, if certified for use in civil aircraft.

661.14 Compressors, if certified for use in civil aircraft.

661.17 Air pumps and vacuum pumps, if certified for use in civil aircraft.

661.22 Air-conditioning machines, if certified for use in civil aircraft.

661.37 Refrigerators and refrigerating equipment, if certified for use in civil aircraft.

661.91 Centrifuges, if certified for use in civil aircraft.

661.97 Filtering and purifying machinery and apparatus, for liquids or gases, if certified for use in civil aircraft.

662.52 Fire extinguishers, if certified for use in civil aircraft.

664.12 Elevators, hoists, winches, cranes, jacks, pulley tackle, belt conveyors, and other lifting, handling, loading or unloading machinery and conveyors; all the foregoing, if certified for use in civil aircraft.

676.16 Accounting, computing and other data processing machines, if certified for use in civil aircraft.

676.31 Office machines, NSPF, if certified for use in civil aircraft.

678.48 Flight simulating machines and parts thereof.

680.61 Gear boxes and other speed changers, other than those provided for in items 680.43 and 680.44, if certified for use in civil aircraft.

681.01 Pulleys, shaft couplings, and parts of the foregoing which are specially designed for installation in civil aircraft; all the foregoing, if certified for use in civil aircraft.

681.18 Torque converters; and parts thereof which are specially designed for installation in civil aircraft; all the foregoing, if certified for use in civil aircraft.

681.24 Chain sprockets, clutches and universal joints, if certified for use in civil aircraft.

682.08 Electrical transformers rated at 1 kVA or more, if certified for use in civil aircraft.

682.42 Electric motors of 1 horsepower or more, but not over 20 horsepower, if certified for use in civil aircraft.

682.46 Electric motors of over 20 but under 200 horsepower, if certified for use in civil aircraft.

682.61 Generators, motor-generators, converters (rotary or static), rectifiers and rectifying apparatus and inductors; all the foregoing which are electrical goods, if certified for use in civil aircraft.

683.62 Ignition magnetos, magneto-generators, ignition coils, starter motors, spark plugs, glow plugs, and other electrical starting and ignition equipment for internal combustion engines, generators and cut-outs for use in conjunction therewith; all the foregoing, if certified for use in civil aircraft.

684.26 Microwave ovens, if certified for use in civil aircraft.

684.31 Cooking stoves and ranges, if certified for use in civil aircraft.

684.42 Furnaces, heaters and ovens, if certified for use in civil aircraft.

684.51 Food warming devices, if certified for use in civil aircraft.

684.72 Microphones, loudspeakers, headphones, audio-frequency electric amplifiers, electric sound amplifier sets comprised of the foregoing components; all the foregoing, if certified for use in civil aircraft.

685.25 Solid state radio receivers, if certified for use in civil aircraft.

685.31 Other radiotelegraphic and radiotelephonic transmission and reception apparatus, if certified for use in civil aircraft.

685.41 Tape recorders and dictation recording and transcribing machines; assemblies and subassemblies of such machines, consisting of two or more parts or pieces fastened or joined together, specially designed for installation in civil aircraft; all the foregoing if certified for use in civil aircraft.

685.61 Radio navigational aid apparatus, radar apparatus, and radio remote control apparatus; assemblies and subassemblies of such apparatus, consisting of two or more parts or pieces fastened or joined together, specially designed for installation in civil aircraft; all the foregoing, if certified for use in civil aircraft.

685.72 Bells, sirens, indicator panels, burglar and fire alarms, and other sound or visual signalling apparatus; all the foregoing which are electrical, if certified for use in civil aircraft.

686.21 Automatic voltage and voltage-current regulators designed for use in a 6-volt, 12-volt or 24-volt system; if certified for use in civil aircraft.

686.25	Automatic voltage and voltage current regulators other than those designated for use in a 6-volt, 12-volt or 24-volt system, if certified for use in civil aircraft.
686.62	Sealed-beam lamps, if certified for use in civil aircraft.
688.14	Ignition wiring sets, if certified for use in civil aircraft.
688.39	Solid-state electronic clocks with modules measuring less than 1.77 inches in width, if certified for use in civil aircraft.
688.47	Electrical synchros and transducers, if certified for use in civil aircraft.
694.16	Civil balloons and airships.
694.21	Civil gliders.
694.41	Civil airplanes (including helicopters).
694.62	Other parts of civil aircraft, if certified for use in civil aircraft.
709.46	Gas masks and similar respirators, if certified for use in civil aircraft.
710.09	Optical instruments other than photogrammetrical instruments and rangefinders, if certified for use in civil aircraft.
710.15	Gyroscopic compasses and parts thereof, if certified for use in civil aircraft.
710.17	Other compasses, if certified for use in civil aircraft.
710.31	Automatic pilots and parts thereof, if certified for use in civil aircraft.
710.47	Other navigational instruments and parts thereof, if certified for use in civil aircraft.
711.33	Liquid-filled thermometers other than clinical thermometers, if certified for use in civil aircraft.
711.39	Other thermometers, if certified for use in civil aircraft.
711.76	Flow meters, heat meters incorporating liquid supply meters, and anemometers; all the foregoing, if certified for use in civil aircraft.
711.81	Pressure gauges, thermostats and other instruments and apparatus for measuring, checking, or automatically controlling the flow, depth, pressure, or other variables of liquids or gases, or for automatically controlling temperature; all the foregoing, if certified for use in civil aircraft.

712.00 Speedometers and tachometers, if certified for use in civil aircraft.

712.06 Electrical optical measuring, checking, analyzing or automatically-controlling instruments or apparatus, if certified for use in civil aircraft.

712.48 Electrical automatic flight control instruments and apparatus, and parts thereof; all the foregoing, if certified for use in civil aircraft.

712.52 Other electrical measuring, checking, analyzing or automatically-controlling instruments and apparatus, if certified for use in civil aircraft.

715.16 Clocks with watch movements or with clock movements measuring less than 1.77 inches in width, if certified for use in civil aircraft.

720.09 Clock movements, assembled, without dials or hands, or with dials or hands whether or not assembled thereon, constructed or designed to operate for over 47 hours without rewinding, having over one jewel, if certified for use in civil aircraft.

727.49 Furniture or reinforced or laminated plastics, if certified for use in civil aircraft.

727.51 Furniture of other rubber or plastics, if certified for use in civil aircraft.

727.56 Furniture, of materials other than unspun fibrous vegetable materials, wood, textile materials (except cotton), rubber or plastics, copper, or leather, if certified for use in civil aircraft.

772.46 Pneumatic tires, of rubber or plastics, if certified for use in civil aircraft.

772.67 Hose, pipe and tubing; all the foregoing NSPF, of rubber or plastics, suitable for conducting gases or liquids, with attached fittings, if certified for use in civil aircraft.

APPENDIX

COMMITTEE ON TRADE IN CIVIL AIRCRAFT

Modification and rectification to the annex to the agreement

Decision of 7 October 1982[1]
(AIR/41)

The following procedures for the application, *mutatis mutandis*[2], of the Procedures for Modification and Rectification of Schedules[3] to the Annex to the Aircraft Agreement have been accepted by the Committee on Trade in Civil Aircraft on 7 October 1982.

1. Changes in the authentic text of the Annex to the Agreement which reflect modifications resulting from negotiations under Article 8.3 or any other relevant Article of the Aircraft Agreement, or any relevant Article of the General Agreement, shall be made by means of Certification. A draft of such changes shall be communicated to the Director-General within three months after the action is completed.

2. Changes in the authentic text of the Lists in the Annex shall be made when amendments or rearrangements which do not alter the scope of an item are introduced in a Signatory's national customs tariff. Such changes and other rectifications of a purely formal character shall be made by means of Certification. A draft of such changes shall be communicated to the Director-General as soon as circumstances permit, but not later than six months after amendment or rearrangement of the national customs tariff.

3. The draft containing changes described above shall be circulated by the Director-General to all Signatories and contracting parties, and shall become a Certification provided no objection has been raised by a Signatory within three months on the ground that, in the case of changes described in paragraph 1, the draft does not correctly reflect the modification or, in the case of changes described in paragraph 2, the proposed rectification is not within the terms of that paragraph.

---

[1] AIR/M/9, page 7.
[2] AIR/M/3, page 9.
[3] BISD 27S/25.

Agreed interpretation of article 2.1.2. of the agreement on trade in civil aircraft

Adopted on 8 March 1983 (AIR/M/10)

The *Committee agreed* to the following interpretation of Article 2.1.2 with the understanding that, pending process in the extension of the Annex, the application should aim at being as broad as possible :

"The Committee agrees that Article 2.1.2 of the Agreement on Trade in Civil Aircraft, which provides for the elimination of "all customs duties and other charges of any kind levied on repairs on civil aircraft", applies only to repairs of complete civil aircraft and those civil aircraft products which are classified for customs purposes under their respective tariff headings listed in the Annex to the Aircraft Agreement".

Common guidelines for binding of duties on repairs, to be inserted as a headnote in signatories' respective GATT schedules,

Agreed on 8 March 1983 (AIR/M/10)

"Duty free or duty exempt treatment is provided for all repairs on civil aircraft in accordance with Article 2.1.2 of the Agreement on Trade in Civil Aircraft, (the term "repairs" includes maintenance, rebuilding, modification and conversion.)"

APPENDIX F

SELECTED COUNTRY PROFILES

United Kingdom

Industry profile

British Aerospace Public Limited Co. (BAe PLC) is the second largest private aerospace company in the free world. British Aerospace, BAe PLC's predecessor, was formed when the British Government nationalized the major independent private aerospace companies under the Aircraft and Shipbuilding Industries Act of 1977. The nationalization forced a merger between British Aircraft Corp., Hawker Siddeley Aviation, Hawker Siddeley Dynamics, and Scottish Aviation. BAe was founded to produce a wide variety of civil and military aircraft, missiles, satellites, and spacecraft components.

The company was partially denationalized in 1980 under the British Aerospace Act when the British Government announced that it would sell up to 100 million ordinary shares to the investing public. 1/ The Government sold 49.3 percent of BAe's stock to the public, 1.94 percent to BAe's employees, and retained the remaining 49.3 percent. British Aerospace Public Limited Co. was formed in 1981, when BAe changed from a company under national ownership to a private-sector public limited company. On January 19, 1985, the British Government announced that it would completely denationalize BAe PLC by divesting itself of the remainder of BAe's stock. 2/ This was done in mid-1985, with the Government retaining only 1 "special share." This share does not carry any voting rights but does allows the Government certain controls, such as the right to appoint the Government director. 3/

BAe PLC consists of the Aircraft and Dynamics operational groups. The aircraft group, responsible for the production of civil and military aricraft, operates production facilities in Surrey, Hertfordshire, Manchester, Prestwick (Scotland), and Lancashire. The Dynamics group, located in Hertfordshire, produces a wide range of missiles and avionics.

BAe manufactures four aircraft models for the commuter and business market. These basic models include the BAe 146, BAe 125, BAe 748, and Jetstream 31. The BAe 146 is a four-engine turbofan jet aircraft designed as a short-haul regional carrier capable of seating between 80 and 111 passengers. The plane was produced with Government support as a joint venture with Avco Corp. (United States) and Saab-Scania A.B. (Sweden). Launching costs for the BAe 146 totaled 137 million pounds during 1980-84. 4/ BAe is responsible for providing the overall design, fuselage components, and final assembly. The wing boxes and engines are built by Avco in the United States, and the tail and moving surfaces of the wings and tail are built in Sweden.

1/ "Another Way to Raise 350 Million," The Economist, Jan. 19, 1985, p. 58.

2/ "State to Divest Itself of BAe And Shorts," Commuter Air, February 1985, p. 12.

3/ Kleinwort, Benson Limited, and Lazard Brothers & Co., Prospectus of British Aerospace Public Limited Company, April 1985, p. 17.

4/ Ibid., p. 17.

Sources in the United Kingdom assert that the wing boxes and engines provided by Avco account for approximately 44 percent of the 146's final value. This aircraft began service in 1983, and by mid-1985, 21 had been delivered to customers.

The BAe 125 is a twin turbofan jet business aircraft seating between 5 and 10 passengers. The plane was developed as a private venture and made its first flight in 1976. Since 1976, approximately 600 orders for various versions have been placed, and 595 planes have been delivered. The newest version, the 125-800, first flew on May 25, 1983. Launch costs for the aircraft totaled 5.9 million pounds ($8.5 million) in 1983 and 4.9 million pounds ($5.9 million) in 1984. 1/ Over 80 percent of the BAe 125's produced have been for export to over 30 countries. However, nearly 60 percent of these exports have been for the North American market.

The BAe 748 was designed as a short-range twin-turboprop airliner with a seating capacity ranging from 40 to 60 passengers. Since its introduction in 1961, there have been repeated updates including several civil and military versions. The BAe 748 is also produced under license in India.

The Jetstream 31, an 18- to 19-passenger commuter aircraft derived from the earlier Jetstream variants, was launched into production in 1981. Launch costs for this airplane totaled 2.4 million pounds ($4.9 million) in 1981 and 4.8 million pounds ($8.4 million) in 1982. 2/ Production levels totaled approximately 3 aircraft per month in mid-1984 to 1985. Company sources noted that production increased to 4 planes per month in late 1985.

The firm has also recently announced the launching of a new commuter aircraft program. This airplane, called the Advanced Turboprop (ATP), is a twin turboprop engine aircraft designed to carry 64 passengers. The projected inservice date is mid-1986, with first customer deliveries scheduled for the third quarter of 1987.

Worldwide deliveries of British Aerospace commuter and business aircraft are shown in table F-1. Commuter aircraft deliveries totaled approximately 58 during 1980-84 and 23 during January-September 1985. Business aircraft deliveries totaled 141 during the 5-year period.

1/ Ibid., p. 15.
2/ Ibid.

Table F-1.--British commuter and business aircraft: Number of worldwide deliveries, 1980-84, and January-September 1985

Item	1980	1981	1982	1983	1984	January-September 1985
Commuter aircraft:						
Jetstream	1/	0	2	8	9	18
BAe-146	1/	0	0	6	1	3
748	1/	7	2	7	6	2
Total	1/	7	4	21	16	23
Business aircraft:						
125-700/800	37	34	28	19	23	1/
Total	1/	41	32	40	39	1/

1/ Not available.

Source: Data provided by British Aerospace Corp. and the General Aviation Manufacturers Association.

Total sales of aircraft and aerospace components at BAe PLC, as shown in the following tabulation, increased irregularly from 1,423 million pounds ($2.7 billion) in 1980 to 2,468 million pounds ($2.9 million) in 1984:

	Sales		Exports	
	Million British pounds	Million U.S. dollars	Million British pounds	Million U.S. dollars
1980	1,423	2,661	789	1,475
1981	1,662	2,724	1,027	1,683
1982	2,300	2,366	1,317	1,928
1983	2,053	2,844	1,417	1,963
1984	2,468	2,912	1,564	1,845

Military aircraft sales constituted the largest proportion of total sales, accounting for approximately 40 percent. The Ministry of Defense is BAe PLC's largest customer, accounting for 45 percent of total military sales and 33 percent of total sales during 1984. Civil aircraft accounted for only 23 percent of total sales in 1984. Sales during January-June 1985 totaled 1.3 billion pounds. 1/

Since the aircraft market in the United Kingdom accounts for only 17 percent of the world's total, exports have become a very important contributor to total sales. 2/ Approximately 55 percent of BAe PLC's total sales were accounted for by exports during 1980 and increased to 63 percent in 1984. Civil aircraft accounted for only 25 percent of BAe PLC's total exports in 1983 and 32 percent in 1984. Company sources indicate that civil aircraft

1/ "Industry," Interavia, October 1985.

2/ "Open Markets," British Aerospace, Inc. Quarterly, November 1984, p. 8.

export sales were affected somewhat in recent years by the decline in the value of the British pound compared with that of the U.S. dollar. 1/

BAe PLC reported that before-tax profits increased irregularly from 52.8 million pounds ($98.7 million) in 1980 to 120 million pounds ($141.6 million) in 1984, as shown in the following tabulation:

Year	Profit or (loss) before taxes	
	Million British pounds	Million U.S. dollars
1980	52.8	98.7
1981	70.6	115.7
1982	(15.6)	(22.8)
1983	82.0	113.6
1984	120.0	141.6

The 1984 figures represent record sales and profit levels for the firm. The 1982 loss figure was reportedly caused by a 100 million pound special provision that reserved money to cover potential losses on delayed sales and financial packages involving civil aircraft, especially the 146 and BAe PLC's portion of the Airbus 310. 2/ Much of the profit recorded by BAe PLC was directly associated with increases in sales of military aircraft and guided missile components. Civil aircraft showed a profit of approximately 7.5 million pounds on sales of 572.0 million pounds in 1984 compared with a profit of 13.6 million pounds on sales of 434.6 million pounds in 1983. British aerospace announced a pretax profit of 68.3 million pounds for January-June 1985. 3/

As shown in the following tabulation, employment at BAe PLC decreased annually from 79,300 in 1980 to 75,998 in 1984, or by 4.2 percent:

Year	Employment
1980	79,300
1981	79,180
1982	79,980
1983	77,980
1984	75,998

BAe PLC began to cut its workforce in 1980, as work on the Airbus (A300 and A310) and the Nimrod military aircraft neared completion. 4/ Further cuts were also made in order to streamline operations, particularly in the aircraft group. In 1984, the aircraft group employed 52,928 workers (70 percent); the dynamics group 22,310 workers (29 percent), and BAe PLC headquarters, 760 workers (1 percent). Wages and salaries paid to workers at BAe PLC increased

1/ "Britain's Aerospace Export Level Holds Steady in 1983", Aviation Week & Space Technology, Mar. 12, 1984, p. 253.

2/ "Three European Firms Report Losses," Aviation Week & Space Technology, Apr. 4, 1983, p. 23.

3/ "Industry," Interavia, October 1985.

4/ "British Aerospace to Cut Work Force By 850," Aviation Week & Space Technology, Jan. 23, 1984, p. 21.

from 674.3 million pounds ($934.2 million) in 1983 to 719.8 million pounds ($849.0 million) in 1984.

Research and development expenditures for military aircraft are developed and financed under contract with the Ministry of Defense. Company officials assert that investments in civil aircraft are financed by BAe PLC from internal sources. BAe PLC's involvement in the A300, A310, A320, BAe 145, Jetstream 31, and the BAe 125 were totally or partially funded internally. The British Government did, however, provide 250 million pounds for launch aid for the A320 project and will provide an additional 50 million pounds to pay levies on A320 sales during 1990-92.

At present, the majority of BAe PLC's civil aircraft research and development efforts are being devoted to the ATP. Company sources indicate that the ATP was designed to satisfy the demand for a more fuel-efficient aircraft and as a successor to the BAe 748. The plane will incorporate new engines plus an advanced designed propellor, and BAe PLC has devoted approximately $75 million to the ATP's initial development.

The following tabulation shows that fixed capital investment at BAe PLC increased irregularly from 2.1 million pounds ($3.9 million) in 1980 to 11.4 million pounds ($13.0 million) in 1984 and that launching costs decreased by 5.3 percent during 1984 compared with those in 1980:

Year	Capital investment Million British pounds	Capital investment Million U.S. dollars	Launching costs Million British pounds	Launching costs Million U.S. dollars
1980-----	2.1	3.9	54.4	101.7
1981-----	1.4	2.3	50.5	82.8
1982-----	1.8	2.6	49.2	72.0
1983-----	2.3	3.2	42.6	59.0
1984-----	11.4	13.5	51.1	60.3

BAe PLC is involved in a variety of military and civil international cooperative programs. The following is a listing of the collaborative civil aircraft programs in which BAe PLC is presently engaged. The company is involved also in preliminary discussions with a Soviet aircraft producer regarding license production of the ATP transport aircraft. 1/

Program	Company and country
A300, A310	Airbus Industries (West Germany, France, Spain, Netherlands, and Italy).
BAe 146	Avco Corp. (United States), Saab-Scania A.B. (Sweden).
BAe 7481	Hindustan Aeronautics (India).
Boeing 757	Boeing Commercial Airplane Co. (United States).
ATP	Hellenic Aerospace Industry (Greece)

1/ "Soviet ATP Production," Aviation Week & Space Technology, Sept. 30, 1985, p. 33.

Government involvement

Industry sources note that the British Government places considerable importance on encouraging advanced technology and wants its aircraft producers to remain at the forefront of the world market. 1/ All British Governments since 1945 have offered some form of Federal aid to their aerospace industries. 2/ One method the British Government has used to aid its aerospace industry is through nationalization of firms to accelerate rationalization. As stated earlier, the present structure of British Aerospace was the result of various Government-prompted mergers through nationalization. Currently, support for civil aircraft is derived from the Science and Technology Act of 1972, the Industrial Development Act of 1982, and the Civil Aviation Act of 1982. Industry aid is reportedly approached on a project basis, with justification of a project dependent upon Government acceptance of the plane's likely profitability and the benefits to the industry and overall economy. 3/ British Government sources note that, in general, funds are not loaned for more than 50 percent of the requested project costs and that a return is expected on the Government's investment.

The British Government also has used tax policy to encourage investment, employment, research and development, and industrial reorganization. The incentives, however, apply equally to all industry or all manufacturing; they do not specifically favor aircraft. 4/

The major incentive for capital investment is accelerated depreciation. Plant and equipment purchased after March 1972 can be totally depreciated in 1 year. If a company's profits are too low to allow it to take full advantage of this provision, this deduction may be taken against income in any of the 3 previous years or in a future year. This provision applies equally to all industries. 5/

The British Government also has certain tax provisions that encourage research and development. 6/ Firms may fully depreciate all assets used in R&D in 1 year, including buildings and land. (All plant and equipment used in manufacturing in the United Kingdom may be fully depreciated in 1 year, but buildings may not be.) Firms may charge all payments to research associations to current expenses. If the Department of Trade and Industry (DTI) approves, these research associations' profits are tax exempt. Research associations make little profit, however, and the DTI requires them to put their profits

---

1/ "UK Aerospace Adjusts to Thatcher Regime", Interavia, August 1982, p. 790.

2/ "British Study Aerospace Involvement," Aviation Week & Space Technology, May 30, 1985, p. 192.

3/ Keith Hayward, Government and British Civil Aerospace: A Case Study in Post War Technology Policy, Manchester University Press, 1983.

4/ U.S. International Trade Commission, Foreign Industrial Targeting and Its Effect on U.S. Industries, Phase II: The European Community and Member States: Report to the Subcommittee on Trade, Committee on Ways and Means, U.S. House of Representatives on Investigation No. 332-163 . . ., USITC Publication 1517, April 1984, p. 100.

5/ OECD, International Investment and Multinational Enterprises, p. 229.

6/ Ibid.

back into research to keep their tax exemption. 1/ Data are not available regarding British Aerospace's utilization of these tax policies.

British Aerospace Corp. executives maintain that, with the exception of a 4-million-pound loan advanced by the British Government in 1973 for early work on the aircraft that became the BAe 146, all investments in civil aircraft have been financed from internal resources. However, in April 1985, the firm's board of directors stated that "the company would not embark on any major new civil aircraft projects in the forseeable future without HM (Her Magesty's) Government launch aid." 2/

The bulk of the research and development done in Great Britain is reportedly done by the industry itself, although some assistance is provided by the Federal government. Establishments providing the majority of research assistance include the Royal Aircraft Establishment and the National Physical Laboratory (NPL) under the Department of Trade and Industry. Research work conducted jointly between industry and government is guided by the Joint Research Committee. A small amount of work is done by the Civil Aviation Research and Development Program Board administered by the Civil Aviation Authority.

Some technology spillover also occurs because of British Aerospace's large military aircraft workload. The Ministry of Defense is concerned with research and development for military aircraft. Ministry of Defense establishments involved in aerospace research include the Aeroplane and Armament Experimental Establishment and the Proof and Experimental Establishments. 3/

Financing assistance is also available to purchasers of British aircraft though the Government's Export Credit's Garantee Department (ECGD). The British aircraft industry appears to receive better terms than those generally available to other industries. 4/ British Aerospace company officials state, however, that this credit facility is rarely used for general aviation aircraft, because preferable financing terms are available from commerical markets. This company, however, has assisted in financing several recent U.S. purchases of commuter aircraft through the awarding of grants from $1 million to $1.2 million. Details of these transactions are discussed in the

---

1/ U.S. International Trade Commission, Foreign Industrial Targeting and Its Effect on U.S. Industries, Phase II: The European Community and Member States: Report to the Subcommittee on Trade, Committee on Ways and Means, U.S. House of Representatives on Investigation No. 332-162 . . ., USITC Publication 1517, April 1984, p. 100.

2/ Kleinwort, Benson Limited, and Lazard Brothers & Co., Prospectus of British Aerospace Public Limited Company, April 1985, p. 11.

3/ The Society of British Aerospace Companies, Britain In Aerospace, 1984, pp. 86-87.

4/ U.S. International Trade Commission, Foreign Industrial Targeting and Its Effect on U.S. Industries, Phase II: The European Community and Member States: Report to the Subcommitee on Trade, Committee on Ways and Means, U.S. House of Representatives on Investigation No. 332-162 . . ., USITC Publication 1517, April 1984, p. 107.

competitiveness section of this report. The Government also recently committed 3.8 million pounds toward the sale of British Aerospace ATP airliner to a Carribean air carrier. 1/

Northern Ireland

Industry profile

There are two civil aircraft manufacturers located in Northern Ireland--Short Brothers Ltd. (Shorts) and Lear Avia. Shorts was founded in 1901 in Hove Sussex as an aerial ballon manufacturer. The firm was nationalized in 1937 by the British Government and relocated in Belfast, Northern Ireland. The British Government owns 100 percent of Short's issued shareholdings.

Shorts consists of three operational divisions (aircraft, aerostructures, and missiles). The aircraft division designs, develops, and manufactures its own aircraft. The aerospace structures division performs as a subcontractor producing parts for a number of aerospace manufacturers. The missile division produces and develops man-portable guided weapons systems, as well as antiaircraft missiles.

The firm, however, is primarily a manufacturer of short-haul commuter aircraft. 2/ The company currently produces the Skyvan, Shorts 330, and Shorts 360. The Skyvan is a short takeoff and landing (STOL), twin-engine turboprop, high wing, square-boxed aircraft widely used as a military transport or freighter. The Shorts 330, a derivative of the Skyvan, which entered service in 1976, is used as a commuter regional airliner, capable of seating up to 30 passengers. The Shorts 360, a derivative of the 330, is a high-wing, widebody regional airliner. This short-haul aircraft, powered by twin turbo-prop engines, is capable of seating up to 35 passengers. The 360, first introduced in late 1982, was produced to perform both as a civil and military aircraft.

The firm's main manufacturing complex at Belfast consists of over 2 million square feet of production area. Company officials note that the basic plant has been the same since the 1930's. However, capital investments have been made in the last 3 years in computer-aided design machinery. Also, equipment for composite production work in the aerostructures division has been installed, as well as robotic testing equipment for the composite parts.

Employment at Shorts totaled approximately 7,300 persons in 1980. The number of workers declined to almost 6,000 in 1981 in response to a decrease in subcontracting work by the aerostructures division. Company employment remained fairly constant during 1981-82, and then increased to 6,265 in 1983. In 1984, the number of workers employed at the Belfast facility was 6,127. Employment increased to approximately 7,000 in 1985 in response to increased civil and military aircraft orders. The labor force at Shorts is fully

---

1/ "Squawks," Commuter World, September-October 1985, p. 58.
2/ "Betting On The Short Hop Market," Industry Week, June 13, 1983, pp. 45-48.

unionized. There are 16 unions in total, but two unions represent the largest portion of the production workers. These two unions are the Amalgamated Engineers Union and the Transport & General Workers Union. Wages paid to Short's employees totaled 78.2 million pounds ($62.6 million) in 1983 and 54.2 million pounds ($49.9 million) in 1984. Data regarding wages for previous years are not available.

Specific figures for research and development expenditures are not available for 1980-82. Design and development expenditures totaled 10.5 million pounds ($8.4 million) in 1983 and 6.8 million pounds ($6.2 million) in 1984. Research work has centered more on nacelle development and composite technology rather than on commuter aircraft. Company officials indicate that research and development for commuter airplanes, as a share of sales, are less than 1 percent. This is due to the fact that the firm's aircraft are derivatives of existing established products.

Table F-2.--Short Aircraft Corp's sales and profit or loss, 1980-84

Year	Sales		Profit or (loss)	
	1,000 pounds	1,000 dollars	1,000 pounds	1,000 dollars
1980	66,964	32,538	(8,260)	(4,014)
1981	90,720	56,114	(8,919)	(5,517)
1982	110,955	78,016	(12,951)	(9,106)
1983	202,297	162,071	(19,099)	(15,301)
1984	163,020	149,959	(2,371)	(2,181)

Source: Compiled from data gathered from discussions with company officials and from Short Brothers PLC, Report and Accounts 1984, 1985.

Overall sales for Short's three divisions are shown in table F-2. Sales increased annually during 1980-83, from 67.0 million pounds ($32.5 million) to 202.3 million pounds ($162.1 million). In 1984 total sales fell to 163.0 million pounds ($150.0 million). Commuter aircraft sales reportedly constituted 40 percent of total sales in 1983 and 31 percent in 1984.

Shorts reported losses in each year during the 5-year period. The loss totaled 8.3 million pounds ($4.0 million) in 1980 compared with 2.4 million pounds ($2.2 million) in 1984. Sales losses reported in 1980 and 1981 were due to heavy investment in the aerostructure division. Interest costs also contributed significantly to the company's lack of profitability. Interest costs totaled 26.4 million pounds during 1980-84. Losses are covered, however, by overdrafts from commercial banks and by direct support from the British Exchequer. On a fiscal year basis (for the fiscal year ended March 31), Shorts reported its first net profit ($750,000) since 1974. 1/

1/ "Short Brothers Records Net Profit," Aviation Week & Space Technology, Dec. 2, 1985, p. 196.

The vast majority of Short's sales are outside the United Kingdom. Although export figures for 1980-82 are not available, company officials note that in 1983, export sales totaled 132.7 million pounds ($106.3 million), or 66 percent of total sales. In 1984, the comparable figure was 117.1 million pounds ($107.3 million), or 72 percent of total sales. The United States was by far the company's most important foreign market, followed by Africa and Europe (excluding the United Kingdom) in 1984. Regarding only commuter aircraft, Shorts indicates that 44 percent of its sales of the model 330 were to U.S. regional airlines, 10 percent to airlines in the United Kingdom and 46 percent to the rest of the world (mainly Asia) in 1984. Sales for the model 360 aircraft totaled 54 percent to U.S. airlines, 23 percent to British airlines, and 23 percent to customers in the rest of the world.

Short Brothers is involved in a variety of international cooperative programs in which the company functions primarily as a subcontractor. The following is a listing of the programs in which Short is currently active.

Company and country	Project
Boeing Commercial Airplane Co. (United States).	757, 747 nacelle components and landing gear doors.
Pratt & Whitney (United States).	757 nacelles.
BAe (United Kingdom)------	BAe 146 components.
Fokker BV (Holland)-------	F-28 wing design and production.
Rolls-Royce (United Kingdom).	Nose cowls for RB 211 jet engines.
Avco-Lycoming (United States).	Engine nacelles for BAe 146.

Lear Avia was initially founded by William Lear in the 1970's to produce a new-technology business jet. After his death in 1978, Lear's wife continued the project. Plans were finalized in early 1980 with the Government of the United Kingdom to establish production facilities in Northern Ireland. The firm continued a small amount of production in Reno, NV. However, the primary manufacturing facility was established in a British Government-built factory in Newtonabbey. 1/ Production area totaled approximately 100,000 square feet. 2/

The Lear Fan 2100 is an 8- to 10-passenger, all-composite business aircraft. Propulsion is accomplished by two pusher propeller engines mounted on the aircraft's V-tail. The plane first flew on Jan, 1, 1981, with more than $210 million having been invested in its development up to that point. 3/

On September 14, 1982, the Lear Avia Corp. was reorganized as a Delaware-registered corporation called Fan Holdings, which owned 100 percent of Lear Avia. Investors in Fan Holdings were a Saudi Arabian group (85 percent), the Lear Group (10 percent), and the British Government (5 percent). However, almost 2 years later, owing to severe production problems and capital

1/ "Jet Could Have Created 2,800 Ulter Jobs," The Times, May 27, 1985, p. 2.
2/ "Lear Avia Builds Almost All-Plastic Plane," American Metal Market, July 7, 1980.
3/ "Learfan: Not Out of the Wood Yet," Interavia, April 1985, p. 315.

shortages, the firm ceased operations. On May 24, 1985, Lear Avia filed for protection under chapter 11 of the U.S. Bankrupty Code.

Employment figures for Lear Avia are not available for the full 5-year period. Employment was established at 560 persons in 1981, fell to 380 persons in 1983, and amounted to less than 30 persons in late 1984. 1/

Government involvement

As noted eariler, the British Government provides financial support to Short Brothers both directly and indirectly through the guarantee of bank overdrafts. The company also has access to capital advances for new programs under the Science and Technologies Act of 1972, the Industrial Development Act of 1982, and the Civil Aviation Act of 1982. Short is also able to take advantage of research and development assistance and tax incentives offered to all companies located in the United Kingdom. 2/ Data regarding the usage of these programs by Shorts, however, are not currently available.

Short Brothers did receive, however, an interest-free loan from the Department of Economic Development of Northern Ireland totaling 22.7 million pounds (almost $44 million). According to company officials, 11 million pounds is repayable on or before March 31, 1989. The remainder is due by March 31, 1991. Additionally, a 10-million-pound note at 9 percent interest and several other loans (at market rates) were guaranteed by the Department of Economic Development for Northern Ireland. These loans are repayable through 1989. 3/

In contrast to Short Brothers, the British Government's financial involvement in Lear Avia is extensive. When the firm relocated to Northern Ireland, the United Kingdom Government initially committed 20 million pounds to the firm. The Government added another 30 million in 1982 to finance the Lear Fan 2100 project. Additionally, the Government guaranteed commerical loans totaling almost 15 million pounds. 4/ Overall, industry sources note that prior to the firm's ceasing operations in 1985, the British Government had invested aid totaling $71.5 million. 5/

Canada

Industry profile

The Canadian aerospace industry is the free world's fifth largest behind the United States, the United Kingdom, France, and West Germany. 6/ The two

---

1/ "The Final Nose-Dive As Lear Fan's Fate Is Sealed," Belfast Telegraph, May 27, 1985, p. 4.

2/ These programs are discussed in detail in the Great Britain section of this appendix.

3/ Short Brothers PLC, Report and Account 1984, 1985.

4/ "The Final Nose-Dive As Lear Fan's Fate is Sealed," Belfast Telegraph, May 27, 1985, p. 4.

5/ "Lear Fan Project Collapses," Business Aviation, June 3, 1985, p. 1.

6/ "Canada is Confident of Share of The World Aerospace Market," Aviation Week & Space Technology, Apr. 18, 1984, pp. 99-102.

principal Canadian airframe manufacturers are Canadair Limited and deHavilland Aircraft of Canada, Limited. Canadair and deHavilland were wholly owned by the Canadian Government. In December 1985, however, the Boeing Corp., a U.S. manufacturer of large transport aircraft, purchased deHavilland from the Canadian Government for $112 million. 1/ The remainder of Canada's aerospace industry is made up of a variety of small components, engines, and avionics manufacturers.

In late 1982, the Canadian Government transfered its shares of Canadair and deHavilland to the Canadian Development Investment Corp. (CDIC). The CDIC was created to maintain the commercial viability of Canadair and deHavilland. It is responsible for the government's investments in the two firms, manages their assets and investments, and oversees all financial planning. The CDIC, a Crown corporation that functions as a Federal holding company, also manages other Government-owned enterprises. Canadian Government sources indicate that, within the CDIC, Canadair and deHavilland are allowed to operate as autonomous entities. Specific information on these two firm is presented in the following sections.

Canadair.--Canadair Limited, located in Montreal, designs, builds, tests, services, and markets its own aircraft. The firm was incorporated in 1944 by British-owned Canadian Vickers and nationalized in 1976, when it was purchased from General Dynamics for Can$46.6 million. Canadair is Canada's largest airframe manufacturer and presently produces the Challenger 600 and 601 business/executive jet, the CL-215 amphibious waterbomber, and a variety of unmanned surveillance vehicles. The firm also does subcontracting work for several leading U.S. aircraft manufacturers. 2/

The Challenger is a twin-turbofan jet aircraft that is produced in two versions, the 600 and the 601. The two versions are the same size and are similar in appearance. The 600 is a transcontinental version, which is powered by Avco Lycoming engines. The 601 is the intercontinental version powered by General Electric engines, having greater range and fuel efficiency. The Challenger has been used to perform military, passenger, and cargo duties. Canadair officials assert that nearly 85 percent of the Challenger's parts and components, except the cabin furnishings, are produced by vendors located in the United States. 3/

1/ Boeing paid $65 million in late December upon closing the sale. The remaining $47 million will be paid in three equal installments over 15 years, or can be discharged through the purchase of $234 million "in Canadian goods and services for purposes unrelated to current deHavilland or Boeing of Canada projects." Richard O'Lone, "Strong Commuter Market Leads Boeing To Acquire deHavilland," Aviation Week and Space Technology, Dec. 9, 1985, p. 28.

2/ "Canada's Long-Range Business Jet and STOL Are Top of The Line In The World Market," Aviation Week & Space Technology, Apr. 18, 1983, pp. 104-106.

3/ "Canadair Goes For The U.S. Market," Interavia, February 1985, pp. 175-176.

As shown in the following tabulation, employment at Canadair increased from 6,596 employees in 1980 to 6,959 in 1981, before declining to 4,315 in 1983:

Year	Employment
1980	6,596
1981	6,959
1982	5,534
1983	4,315
1984	4,519

The decline in employment was caused primarily by a company decision to downsize and reduce overhead costs by decreasing the number of indirect workers. Additionally, a major restructuring of senior management resulted in a change in company policy which led to employment reductions. Employment totaled 4,519 in 1984.

Canadair production of business aircraft increased from 24 in 1981 to 43 in 1982. Production then declined to 26 aircraft in 1983 and 20 aircraft in 1984. Total sales at Canadair increased annually from Can$115.6 million (US$176 million) in 1980 to Can$429 million (US$582 million) in 1982 before declining to Can$387 million (US$504 million) in 1983 (table F-3). Sales totaled Can$177.0 million (US$137 million) in 1984. The decline in 1984 was primarily due to the continued depressed state of the aircraft industry.

Table F-3.--Canadair: Canadair's total sales and exports, 1980-84

Year	Total sales		Exports	
	Million Canadian dollars	Million U.S. dollars	Million Canadian dollars	Million U.S. dollars
1980	115.6	176.1	93.0	141.7
1981	116.2	160.4	233.7	322.6
1982	429.4	582.4	371.4	503.7
1983	387.1	504.3	342.8	446.5
1984	177.0	136.7	1/	1/

1/ Not available.

Source: Canadair Annual Report 1984, and report from U.S. Embassy, Ottawa, May 1985.

Canadair is an important exporter of aircraft. Exports increased from Can$93 million (US$142 million) in 1980 to almost Can$343 million (US$447 million) in 1983. Exports accounted for 86 percent of total sales in 1982 and 89 percent in 1983. Data are not available for 1984. However, company officials indicated that over 50 percent of total sales were to U.S. customers.

Canadair reported that net profits declined annually from Can$3.5 million (US$5.3 million) in 1980 to a loss of Can$334 million (US$434 million) in 1983. Company sources indicate that the losses reflect the increasing development costs of the Challenger program, declining sales, and high interest payments on money borrowed from the Canadian Government. The 1982 loss included a $1.05 billion writeoff of development costs related to the Challenger aircraft. The firm reportedly posted a profit in 1984 because of a complicated Canadian Government investment scheme. 1/

Year	Net profit or (loss) Million Canadian dollars	Net profit or (loss) Million U.S. dollars
1980----------	3.5	5.3
1981----------	3.0	4.1
1982----------	(1,415.0)	(1,919.0)
1983----------	(334.2)	(435.4)

De Havilland.--The deHavilland Aircraft of Canada Limited was incorporated in 1928 as a subsidiary of the deHavilland Aircraft Co. Limited of the United Kingdom. DeHavilland subsequently became part of the the British Hawker Siddeley Group. Ownership was transferred in 1974 from Hawker Siddeley to the Canadian Government for Can$40 million. 2/ The company, located in Downsview, ON, is primarily a manufacturer of civil aircraft. 3/ DeHavilland designs, manufactures, tests, and markets its own aircraft. The company presently produces the Twin Otter, the Dash 7, the Dash 8, the Buffalo, and the Transporter, as well as being involved as a subcontractor for several major international large aircraft manufacturers.

The Twin Otter is a high-wing, twin turboprop aircraft with short takeoff and landing capability, seating between 19 and 20 passengers. It is presently in use as a commuter/regional, executive transport, and quasi-military aircraft. Since its entry into service in 1966, over 800 Twin Otter's have been delivered to customers in over 74 countries. Company officials indicate that the firm produces approximately 1 Twin Otter per month. Canadian content accounts for nearly 80 percent of the value of the Twin Otter.

The Dash 7 is a short-haul, high-wing STOL passenger/cargo, four-engine turboprop capable of seating up to 50 passengers. Since its introduction in 1977, 108 Dash 7's have been delivered to customers in 20 countries, with nearly 50 percent of all Dash 7's in operation being flown by U.S. based commuter/regional airlines. The breakeven point for the Dash 7 is 122

1/ "Govt. Bailout Lets Canadair Declare Profit," The Citizen, Aug. 31, 1984, p. 15.
2/ "Canada and Aerospace," Aviation Week & Space Technology, May 2, 1983, p. 9.
3/ "Concentration on The Commuter Market," Commuter Air, January 1983, pp. 32-34.

aircraft. 1/ Production has averaged slightly less than one plane per month, being adversely affected since mid-1981 by U.S. air traffic restrictions, and the sale of used Dash 7's at depressed prices by U.S. commuters in financial difficulty. 2/

DeHavilland officials assert that the Dash 8 was designed to fill the void between the 19-seat Twin Otter and the 50-seat Dash 7. The plane is a high-wing, STOL twin turboprop capable of seating up to 36 passengers. The initial funding for the Dash 8 was provided by the Government in the form of guaranteed loans up to a ceiling of Can$450 million. The Dash 8 was manufactured primarily to be sold to commuter/regional airlines in North America, with the breakeven point at 400 aircraft. 3/ Sources at deHavilland indicate that over 70 percent of the content of the Dash 8 is Canadian; 24 percent, American; and 4 percent, British.

The work force at deHavilland increased from 4,746 workers in 1980 to 5,415 in 1981 before falling to 4,163 in 1982, as shown in the following tabulation:

Year	Employment
1980	4,746
1981	5,415
1982	4,163
1983	2,684
1984	3,500

Employment further declined to 2,864 in 1983. Employment reductions came as a result of decreasing demand for commuter aircraft which forced deHavilland to reduce costs by laying off production workers. The number of employees rose by 22 percent, to 3,500, in 1984 in response to increased Dash 8 sales. 4/

Production of commuter aircraft by deHavilland decreased from 94 and 99 in 1980 and 1981, respectively, to 68 in 1982. In 1983, production declined further to 12 aircraft. Data regarding the firm's 1984 production are not available, but deliveries totaled 23 in that year. 5/ DeHavilland's total sales increased annually from Can$173 million (US$265 million) in 1979 to Can$450 million (US$611 million) in 1982 (table F-4). Data regarding sales for 1983 are not comparable with those for previous years, as these are available on a calendar year basis, as opposed to previous fiscal year information. Industry sources indicate, however, that sales decreased in 1983 in response to the worldwide recession. DeHavilland sales data for 1984 are not currently available.

1/ David Godfrey, "Boeing Dashes for deHavilland," Commuter Air, January 1986, p. 13.

2/ "Concentration and the Commuter Market," Commuter Air, January 1983, p. 11.

3/ Op. cit., "Boeing Dashes for deHavilland."

4/ Report from U.S. Embassy, Ottawa, May 1985.

5/ U.S. Department of State Airgram, May 10, 1985.

Exports represent an important portion of deHavilland's total sales, accounting for 94 percent of total sales in 1982 and 88 percent in 1983. Exports of commuter aircraft by deHavilland were adversely affected by a soft market for all aircraft and the large number of competitive products available.

Table F-4.--De Havilland's aircraft deliveries, sales, and exports, fiscal years 1980-83 1/

Year 1/	Aircraft deliveries	Sales		Profit or (loss)	
		Canada	United States	Canada	United States
		Million dollars			
	Number				
1980	92	247.9	377.7	210.0	320.0
1981	99	358.2	494.4	324.7	448.2
1982	68	450.5	611.0	425.3	576.8
1983	23	2/	2/	2/	2/

1/ Fiscal years are from June 1 to May 31.
2/ Not available.

Source: De Havilland Annual Report 1984, and Report from U.S. Embassy, Ottawa, May 1985.

Data regarding research expenditures of deHavilland are not available for 1980-82. However research funding increased from $13.6 million in 1983 to $15.2 million in 1984. Much of deHavilland's R&D expenditures have been devoted to the Dash 8. Total development costs for the Dash 8, including the stretched version of this aircraft, will be between Can$500 million. 1/ The Boeing Corp. recently announced their plants to inject Can$115 million into modernizing and upgrading the deHavilland plant. 2/

DeHavilland's net profit increased irregularly from Can$1.7 million (US$5.7 million) in 1979 to Can$6.4 million in 1981 before falling to Can$20 million (US$2.7 million) in 1982, as shown in the following tabulation: 3/

1/ David Godfrey, "Boeing Dashes for deHavilland," Commuter Air, January 1986, p. 14.
2/ Lisa Bannon,"Boeing To Upgrade deHavilland Aircraft Plant, American Metal Market, Dec. 9, 1985, p. 1.
3/ Report from U.S. Embassy, Ottawa, May 1985.

Year	Net profit or (loss)	
	Million Canadian dollars	Million U.S. dollars
1980 1/	1.7	2.6
1981 1/	6.4	8.8
1982 1/	2.0	2.7
1983	2/	(191.5)
1984	2/	(31.1)

1/ Based on a fiscal years from June 1 to May 31.
2/ Not available.

Data are not strictly comparable for 1983 and 1984 because of a change in accounting practice. DeHavilland losses totaled $191.5 million in 1983 and $3.1 million in 1984. In the first nine months of 1985, deHavilland lost Can$55.1 million. 1/ Company sources state that the decline in net profit can be attributed to the continued development costs of the Dash 8, soft markets for all aircraft, and high rates of interest paid on money borrowed from the Canadian Government. 2/

Canada's aerospace manufacturers are involved in a variety of international cooperative programs. A listing of those programs follows.

Company	Programs
Canadair	Boeing 747 SP
	Boeing 767
	Lockheed
	CP-140 Aurora
	Lockheed P-3C, C-5B Galaxy
	McDonnell Douglas F-15 Eagle
	McDonnell Douglas F18A Hornet
	Grumman EF-111A
	Northrop F-5
DeHavilland	A320 Airbus program

Government involvement

Canadian industry officials note that the elements of Government involvement in the commuter and business aircraft industries include the support of innovation through government-sponsored research and development, and the encouragement of government procurement to ensure maximum Canadian development and production. 3/ Rationale for government investment relates to national security and stimulating high technology in Canada.

1/ David Godfrey, "Boeing Dashes for deHavilland" Commuter Air, January 1986, p. 13.

2/ "U.S. To Question Canadian Support of Aero Industry," American Metal Market, Metalworking News, Oct. 8, 1984, pp. 4-14.

3/ Aerospace Industries Association of Canada, Aerospace Industry-A Solid Investment In Canada's Future, September 1983.

Both commuter and business aircraft manufacturers in Canada were 100 percent owned by the Federal Government during 1980-84. As stated earlier, these firms have been controlled by the CDIC since 1982. Most of the government support (in the form of equity investment) is directed through this entity. The Government also provides research and development and export assistance.

The Canadian Government encourages R&D investment through tax incentives and special assistance programs. Tax incentives are provided through three avenues:

-tax reduction for R&D expenditures;
-scientific research tax credit for investments in crown corporations applied against Federal income taxes;
-tax credit at a basic rate of 20 percent for R&D expenditures.

Assistance programs include the Defense Industry Productivity Program (DIPP), the Industrial and Regional Development Program, the Industrial Research Assistance Program, and the Program for Industry/Labor Projects. 1/

The DIPP has been in existance since 1959 and is primarily beneficial to the Canadian aerospace industry, with 70 to 80 percent of its expenditures dedicated to research in the area. The three components of this program include research and development in defined areas, capital equipment investments for plant modernization, and the establishment of manufacturing sources in Canada for export markets. Also they assist in defense market feasability studies. Industry sources note that the orginal objective of the DIPP to sustain and develop Canada's defense industrial base has broadened, with the current emphasis on defense technology with civil sales potential. DIPP annual funding for the entire aerospace sector (including commuter and business aircraft) averaged Can$99 million during 1981-83 and was estimated to total Can$112 million in 1984. 2/

The remaining R&D programs, although not aerospace specific, could provide benefit to Canadian commuter and business aircraft producers. The Industrial and Regional Development Program assists in developing projects to the market stage and strives to improve the international competitiveness of Canadian firms. Financial support for this program is provided through loans or loan guarantees, insurance on surety bonds, and grants. Annual funding for Canadian aerospace industry projects under this program averaged Can$20 million during 1981-83. 3/ Figures for 1984 are not available.

The Industrial Research Assistance Program, which originated in 1962, currently supports approved research projects of 2 to 3-year year duration. Financial assistance to cover employment expenses of scientists and technical personnel can cover up to 50 percent of the overall program costs. Canadian Government funds from this program benefiting aerospace-related endeavors averaged $104 million annually during 1981-83. 4/ Data on funding in 1984 is not available.

1/ Margaret Keshishian, U.S. Department of Commerce, Office of Aerospace, Canadian Government Support for the Aerospace Industry, November 1984.
2/ Ibid.
3/ Ibid.
4/ Ibid.

The Program for Industry/Labor Projects provides for the transfer of National Research Council research results to industry for development of commerical applications. Underwriting the project development costs is the main area of assistance from this program. To date, however, funding under this program has not been for commuter or business aircraft programs, only for space-related research. 1/

Because of their Federal ownership, both Canadian firms have been the recipients of large infusions of Government aid. Since their purchase in 1974 by the Canadian government, Federal support for deHavilland totaled Can$950 million. The comparable figure for Canadair since their Government purchase in 1976 is Can$2.1 billion in loan guarantees and equity infusions. 2/ Specific investments are detailed in table F-5.

Table 5.--Canadian Government investment in commuter and business aircraft, by firms, 1981-84

Period	Firm	Investment 1/
Early 1981	deHavilland	$450 million in loans for Dash 8 development underwritten.
March 1982	Canadiar	Loan guarantee of $1.35 billion.
November 1982	do	$200 million equity infusion.
November 1982	deHavilland	$200 million equity infusion.
June 1983	do	$60 million equity infusion.
June 1983	Canadair	$240 million equity infusion.
March 1984	deHavilland	$240 million equity infusion.
Mid 1984	Canadiar	$310 million equity infusion.

1/ Data are in Canadian dollars.

Source: Margaret Keshishian, U.S. Department of Commerce, Office of Aerospace, Canadian Government Support for the Aerospace Industry, November 1984.

The Export Development Corporation (EDC) is a Government-owned entity established in 1968 to facilitate and develop export trade for Canadian corporations. This organization provides export financing through loans or guarantees, export credit insurance, foreign investment guarantees, and surety and performance guarantees. 3/ Data regarding specific loans or insurance provided to purchasers of Canadian commuter or business aircraft during 1980-84 are not available. However, this entity did recently provide 10-year financing for 58 percent of the total purchase price of several deHavilland commuter aircraft. The remainder was financed by a 50-year interest-free loan from the Canadian Government. 4/

1/ Ibid.
2/ Ibid.
3/ Ibid.
4/ "Liat Dash 8 Financing Clarified," Air Finance Journal, 1985, p. 30.

In conclusion, government support for Canadair and deHavilland averaged Can$833.3 million annually during 1981-83 for all of the programs herein described. 1/ Canadian Government sources indicate, however, that these figures overstate Federal support. They also note that research and development monies granted for civil projects are repayable in accordance with the Civil Aircraft Agreement. Additionally, these officials state that the loans and investments made in these two crown corporations were made with an expectation of recoupment of the costs. 2/ Canadair Ltd. officials note that the capital infusions do "not constitute a subsidy - but rather a realization by the Government as the shareholder that Canadair must be funded as a commerical enterprise in order to function in the private enterprise system against commerical competitors with a capital structure featuring a normal debt/equity ratio." 3/

The Canadian Government announced on October 30, 1984, their intent to make private both aircraft manufacturers. The expected sale price was approximately $2 billion. 4/ The sale was dependent upon guarantees that the purchaser will retain the manufacturing facilities in Canada. 5/ In December 1985 the Boeing Corp., a U.S. manufacturer of large transport aircraft, purchased deHavilland from the Canadian Government for $112 million. Boeing agreed to "make a substantial investment" in the deHavilland facility at Downsview and to pay royalties to the Canadian Government on future deHavilland aircraft sales. 6/ A further contingency regarding the sale of Canadair is that Challenger program and support will continue for at least 10 years. 7/ Although interest has been shown by both U.S. and foreign companies in Canadair, no purchase has been made to date.

France

Industry profile

At the end of World War II, the French aerospace industry was behind the major world producers in many areas of aerospace technology. By the end of the 1950's, however, the industry had rebounded and began to market its first medium-range jet airliner. During the 1960's, France began exporting military aircraft and became involved in several European collaboration programs. The next 10 years were devoted to achieving a balance between the civilian and military sectors through heavy investments by a succession of governments. The industry was nationalized in the late 1970's. Their domestic market accounts for slightly more than one-third of total turnover for the industry.

1/ "Canada to Continue Industry Investment," Aviation Week & Space Technology, Sept. 3, 1984, p. 224.

2/ Letter to S. Bath, Director of Office of Aerospace Policy and Analysis, U.S. Department of Commerce, by Pierre Cosselin, Minister-Counsellor, Canadian Embassy, Sept. 9, 1985.

3/ Canadair Ltd., Challenger USA, 1983.

4/ Report from U.S. Embassy, Ottawa, Nov. 1, 1984.

5/ "Canada To Sell Off State Assets," Financial Times, Oct. 31, 1984.

6/ Richard O'Lone , "Strong Commuter Market Leads Boeing To Acquire deHavilland," Aviation Week & Space Technology, Dec. 9, 1985, p. 28.

7/ "Challenger Seminar," Business and Commercial Aviation, September 1985, p. 196.

In order to maintain a healthy level of production and to progress, the industry must rely on its ability to export. 1/

The French light aviation industry consists of four manufacturers - SOCATA, Avions Pierre Robin, Avions Mudry, and Cessna associate Reimes Aviation. However, the aircraft produced by these firms are not covered in the scope of this study. There are also two French producers of business and commuter aircraft, Avions Marcel Dassault Breguet Aviation (Dassault), and Societe Nationale Industrielle Aerospatiale (Aerospatiale). In 1985, there were 41,000 employees in France's civil aviation industry. 2/ These figures, however, include larger aircraft not included in this report.

Dassault.--Dassault, which is 51 percent owned by the Government, produces business aircraft. Dassault manufactures four models of the Mystere-Falcon, including the Falcon 20 or 200, 50, 10 or 100, and 900. The Falcon 50 is a long-range tri-jet derivative of the Falcon 20. The Falcon 100 is a successor to the Falcon 10, which is a small, twin-jet business plane. The Falcon 200 is considered to be an updated version of the Falcon 20, which was first produced in 1963. 3/ The Falcon 900 is an enlarged version of Dassault's Falcon 50 and is designed for the medium- to long-range executive and business transport market. Development and production costs are expected to total $300 million. This aircraft is scheduled for delivery in early 1987 at a price of $13.5 million. As of December 1985, Dassault had signed contracts for 51 Falcon 900's. The production rate for the Falcon 900 is expected to be 3.5 aircraft per month by June 1987, with the possibility of 4 per month if necessary. 4/

Falcon Jet of Teterboro, NJ, is a subsidiary of Dassault and handles sales, after-sales support, finishing, and the modifications of all models of Falcon Jet aircraft for North and South America, Australia, and certain Far Eastern countries. Dassault in France sells directly to all other geographic areas. 5/

Dassault's production of business aircraft declined by 50 percent, from 59 units in 1980 to 29 units, in 1984 (table F-6). Production peaked at 82 units in 1981 and then decreased steadily.

1/ "The French Aerospace Industry: What Price Maturity?" Interavia, April 1983, p. 325.

2/ Data provided by Directorate General of Civil Aviation, May 1985.

3/ "Under Clouded Skies", Interavia, May 1985.

4/ "Dassault Weighs Raising Falcon 100 Production," Aviation Week & Space Technology, Jan. 20, 1986, p. 100.

5/ Report from U.S. Embassy, Paris, April 1985.

Table F-6.--Dassault's production of aircraft, by models, 1980-84

Model	1980	1981	1982	1983	1984
F10/100	19	15	11	5	4
F20	16	25	8	10	2
F50	24	42	49	14	14
F200	-	-	-	9	9
Total	59	82	68	38	29

Source: Report from U.S. Embassy, Paris, April 1985.

Company officials indicate that the economic recession in 1983 had the most serious effect on the demand for the smaller, short-range products--the Falcon 10/100 and 20/200. There was an order boom for the Falcon 50 in 1980 and 1981, but by 1983, Dassault was forced to cut back production rates of this aircraft considerably. 1/ Despite this reduction, industry analysts note that the company has been able to increase its market share in the United States. Combined orders in 1985 for Dassault's model 100, 20, and 50 aircraft totaled 27. 2/

Dassault's net income rose by 9.6 percent, from $42.1 million in 1983 to $46.2 million in 1984. Data for previous years are not available. Despite rising U.S. competition and declining orders for Europe's aviation industry, Dassault officials state that the firm was able to maintain its market share during this period. 3/

Aerospatiale.--Aerospatiale is reported to be the largest aerospace company in the Common Market. It is owned and controlled by the Government of France. The company was formed on January 1, 1970, as a result of a merger of Sud Aviation, Nord Aviation, and SEREB companies. In 1981, Aerospatiale and the Italian firm Aeritalia signed an agreement for the joint production of the ATR 42, a 42-seat commuter turboprop. 4/ Two versions of the ATR 42 are being offered, the series 100, which carries 42 passengers, and the series 200, a 46-passenger aircraft. Both are twin turboprop aircraft with certification scheduled for late 1985. As of January 1986, there were firm orders for 45 aircraft with options on 38 more. 5/ Production rates are currently 2.7 per month but are expected to increase to 3 per month by early 1986. 6/ The ATR 72, a stretched version of the ATR 42, will seat up to 70 passengers. This

1/ "The French Aerospace Industry: What Price Maturity?", Interavia, April 1983.

2/ "Dassault Weighs Raising Falcon 100 Production," Aviation Week & Space Technology, Jan. 20, 1986, p. 100.

3/ The Wall Street Journal, June 6, 1985.

4/ Jane's All the World's Aircraft, 1980-1981.

5/ "Finnair Signs First Firm Order For Five ATR72 Transports," Aviation Week & Space Technology, Jan. 27, 1986, p. 36.

6/ Data provided by Aerospatiate officials, June 7, 1985.

aircraft is scheduled for delivery in January-February 1988. To date Aerospatiale has five orders and 16 options for this aircraft. 1/

Aerospatiale has four production plants, located in St. Nazaire, Nantes, Meaulte, and Toulousse, France. The facility at St. Nazaire, with manufacturing area of 131,801 square meters, employed 2,636 persons in 1984. Specializing in numerically controlled forming operations, this plant produces the ATR 42 wing center box as well as fuselage sections for the Airbus A300 and A310, and the Falcon 20 and 50 models. At Nantes, composite parts are manufactured in the 133,547-square-meter facility. Employing 2,400 workers in 1984, this plant produces the outer wing for the ATR 42; parts for the Falcon 20 and 50, the A300, the A310; and the Mirage 2000. At Aerospatiale's facility at Meaulte spare parts for the Nord 262 plane, as well as structural parts for the A300, A310, and Mirage were manufactured by 12,333 persons in 1984. The manufacturing area of the Meaulte plant is 66,457 meters. The main plant at Toulousse performs research work and manufacturing operations, as well as final assembly and testing of the ATR 42, Transall, the A300, and the A310. Employment totaled 7,252 persons in 1984 at this facility of 399,028 square meters. 2/

In 1984, Aerospatiale sources note that the firm was forced to invoke temporary layoffs and intermittent plant shutdowns as a result of declining, sales volumes. Under an agreement with the Government, the company accelerated the introduction of the 37-hour work week at some of its facilities. Aerospatiale was to compensate the workers for a portion of the cutback in hours. The Government in turn agreed to provide financial support to the company. 3/

Aerospatiale sources note that significant capital improvements have been made at these plants during 1980-84. Although total figures are not available, in 1982, such investments amounted to $200 million. 4/ Improvements have been made in the areas of computer-aided design and manufacturing, mechanization of production facilities, and in techniques to handle advanced composite materials. Robotics, however, are currently only utilized to make wire harnesses for aircraft applications. 5/

Cooperation in civil as well as military aviation is firmly entrenched within the French Government, as well as the aerospace industry. However, French officials state that they are also determined to preserve research and development policies that ensure the nation's independence and capability in all areas. 6/ Aerospatiale has developed an extensive network of cooperative programs and is one of the most active French firms in this area. Some examples of joint cooperation programs that the French aerospace industry has been involved with include the Airbus Industrie A300/A310 transport; the

---

1/ Op. cit., Aviation Week and Space Technology, Jan. 27, 1986, p. 36.
2/ Data provide by Aerospatiale officials, June 7, 1985.
3/ "Sales Log Spurs Aerospatiale Cuts," Aviation Week & Space Technology, Jan. 16, 1984, p. 20.
4/ Aviation Week & Space Technology, Aug. 5. 1985.
5/ Data provided by Aerospatiale officials, June 7, 1985.
6/ "Nationalization! Is That What You Said?", Interavia, June 1982, p. 582.

Ariane launch vehicle; and the Euromissile line of HOT, Milan, and Roland missiles. A major portion of these cooperative programs are with West Germany and cover commercial aircraft satellite and missile programs. Other programs join France with Great Britain, Sweden, Holland, Spain, and other countries. However, none of these programs fall within the scope of this study. 1/

The joint production agreement between Aeritalia and Aerospatiale for the ATR 42 is the only cooperative agreement involving business or commuter aircraft. Industry sources indicate that Aerospatiale and Aeritalia rely on the French and Italian Governments to finance their sales. However, the two companies are planning to establish a finance subsidiary in the United States with the participation of American partners.

Government involvement

The French Aerospace industry has traditionally been closely dependent on Government funding and support from diverse Government agencies. Although the French industry has matured, it continues to receive substantial Government support, not only in the form of study contracts and orders, but also with regard to support of commercial activities in the foreign market. Through a succession of Governments, the major policy towards the aerospace sector has been the promotion of exports. 2/ Two areas of France's aerospace industry that have received significant Government backing are the development of robotics and new engines. 3/

France is the only Western country in which a single agency or ministry, the Directorate General of Civil Aviation (DGAC), administers all aspects of civil aviation activity, including aircraft manufacturing. The Department of Civil Aviation Program (DPAC), a department under the DGAC, is responsible for proposing and implementing Government policy with respect to civil aircraft, including business and commuter aircraft. The DPAC defines Government action concerning the development, production, sales, and commercial promotion of aeronautical equipment. In addition, this department prepares and negotiates international agreements that sets the framework for international cooperation and financing of aeronautical programs. 4/

French Government involvement is generally directed through the DGAC. This involvement most often takes the form of Government planning and ownership of major industrial sectors. The Government owns important portions of both commuter and business aircraft manufacturers. In regard to planning, the French system is based on consultations among all Government departments and the planning Commission. Although the Government prepares the plan after consulting with the private sector, the plans are not binding on private business. However, the Government actively promotes the plan's objectives

1/ "Finance Planning More Joint Programs," Aviation Week and Space Technology, May 30, 1983, p. 84.

2/ "Under Clouded Skies," Interavia, May 1985.

3/ "Financial Aid in France Threatened by Economy," Aviation Week and Space Technology, Sept. 6, 1983.

4/ Data provided by the Directorate General of Civil Aviation, May 1985.

through administrative guidance and through the use of credit, taxation, and subsidies. 1/

Accelerated depreciation is one form of tax assistance given by most developed countries, including France. In France, accelerated depreciation is aimed primarily at increasing the general level of investment. For a number of years, before the new Government assumed power in 1981, France's system of accelerated depreciation was used primarily to promote construction. After a building was completed, a business could depreciate 25 percent of its cost in the first year. The remaining value of the building was depreciated over the normal useful life of the asset.

When the new Government came into power in 1981, an investment tax deduction was introduced as an incentive to raise both investment and employment. The new law permitted a business to deduct 15 percent of its total 1982 investment in capital goods in 1982, 10 percent in 1983, and 5 percent in 1984. To be eligible for the deduction, firms with fewer than 100 employees must agree to maintain their employment level, and firms with 100 employees or more must agree to increase their employment.

In 1983, a new accelerated depreciation law was introduced. Unlike the old accelerated depreciation law, the new one does not primarily cover construction, but allows accelerated depreciation of the following assets:

- -assets used for industrial operations involving the manufacture of goods, their processing, and the transportation of such goods;
- -assets used for the handling of goods;
- -installations for the purification of water or air;
- -installations to produce steam, heat, or energy;
- -safety devices;
- -installations to provide medical care;
- -office furniture with the exception of typewriters;
- -assets used for scientific or technical research;
- -installations used for the storing of goods with the exclusion of building concerned; and
- -hotel buildings and assets used for such buildings. 2/

The French Government also provides a special tax regime for firms to promote mergers. If a merger were to take place under ordinary French tax principles, the absorbing company would become liable for a large, immediate tax liability--the capital gain from revaluing the absorbed company's assets. To reduce this burden and encourage mergers, a special tax system applies for company reorganizations. Because the French Government actively encourages strong enterprises to take over weak ones in the hopes of saving jobs, this tax provision is an important part of French industrial policy. Matchmaking that leads to mergers is carried out by the Interministerial Committee on Industrial Restructuring (CIRI). CIRI or its predecessor has been in

1/ U.S. International Trade Commission, Foreign Industrial Targeting and its Effect on U.S. Industries Phase II: The European Community and Member States: Report to the Subcommittee on Trade, Committee on Ways and Means, U.S. House of Representatives on Investigation No. 162, USITC, Publication 1517, April 1984, p. 44.

2/ Ibid., p. 56.

existence since 1973 and is currently helping about 140 industrial companies restructure. 1/

Equity infusions are also provided by the Federal Government, as well as loans, research and development support, and development grants. 2/ The DGAC and the Ministry of Transport (MOT) are the key agencies involved in these assistance programs. The MOT is involved in both basic aeronautical research and specific aircraft-related programs. The Office Nationale D' Etudes Et De Recherches Aerospatiale (ONERA) coordinates French research. Research facilities of the Ministry of Defense also provide indirect support to aerospace producers. 3/ However, the level of cross-subsidization from military to civil programs is extremely difficult to quantify. Members of the MOT also are part of the Board of Directors of the nationalized producers.

Approximately 93 percent of R&D for France's aerospace industry is controlled by the Government. Between 1970 and 1979, industry sources estimate that Government aid to the aeronautical industry exceeded $15 billion at an average of $1.67 billion per year.

Direct support for civil aircraft programs is also provided by the French Government. Federal authorizations for the ATR42 commuter airplane are shown in the following tabulation (in millions of dollars): 4/

Year	Authorization
1981	4.6
1982	45.7
1983	30.6
1984	53.7
1985	11.1

Authorizations for Dassault projects for 1980-83 are not available. However, there were no authorizations for the Falcon 900 in 1984 and a $21.5 million authorization in 1985. Exact expenditures from these authorizations are not available.

The French Government also provides funding for 50 to 80 percent of development and production costs in reimbursable loans. 5/ In May 1984, the Government approved a low-interest loan amounting to 30 percent of the $300 million development costs of the Falcon 900. 6/ Officials of Dassault's U.S. subsidiary Falcon Jet indicate, however, that the company did not draw on this loan. 7/ Aerospace industry sources contend that the existance of the

---

1/ Ibid., p. 57.

2/ Data provided by Jeff Jackson, U.S. Department of Commerce, Office of Aerospace.

3/ Ibid.

4/ Ibid., and Budget Vote de 1985, Government of France, II Transport-Aviation Civil, 1985.

5/ "French Near Decision on Loan To Dassault For Falcon 900," Aviation Week & Space Technology, Jan. 16, 1984, p. 20.

6/ "French Dassault Negotiate Falcon 900 Loan," Aviation Week & Space Technology, March 26, 1984, p. 23.

7/ Textimony of Frank Wiesekal, president, Falcon Jet Corp., at the United States International Trade Commission hearing, Aug. 26, 1985.

Government loan could have enabled Dassault to obtain commerical loans at lower-than-normal commerical rates.

The French Compagnie Francaise d' Assurance au Commerce Exterieur (COFACE) is an export and insurance company that guarantees national exporters against losses on their operations in foreign markets. These include insurance for risks of political changes and credit failure. 1/ Aerospatiale is expected to rely upon the French Government to provide financing assistance. 2/ However, industry sources note that (COFACE) loans are no longer in French francs but in U.S. dollars. This makes them less desirable for purchasers of business and commuter aircraft. 3/

Japan

Industry profile

Japan's aerospace industry emerged during the 1930's, and by World War II, it was one of the world's leaders in the production of military aircraft. At the end of World War II, however, all research and production of aircraft were prohibited. For 7 years, not a single aircraft was produced in Japan. In 1954, the Japanese Defense Agency was established, creating a demand for military aircraft. During the same year, Japan enacted the Aircraft Manufacturing Enterprises Law aimed at coordinating aircraft production and exempting the industry from Japan's antimonopoly law. In 1957, a joint project between the Government and private sector was established to produce Japan's first commuter aircraft, the YS-11, a twin-engine turboprop. Between 1961 and 1972, Japan produced 182 of this model aircraft.

Currently, commuter and business aircraft account for only a small portion of Japan's aircraft industry, with about 80 percent of Japan's aircraft production accounted for by defense purchases. 4/ The growth of Japan's aerospace industry has been limited because of a constitutional prohibition on the development of a military establishment and the small size of its domestic market. 5/ Japanese industry sources assert that they are operating under a severe handicap compared with U.S. and European producers. 6/

Mitsubishi Heavy Industries (MHI) is the only producer of commuter or business aircraft in Japan. Mitsubishi Aircraft International (MAI) was a

---

1/ U.S. International Trade Commission, Foreign Industrial Targeting and Its Effects on U.S. Industries, Phase II: The European Community and Member States: Report to the Subcommittee on Trade, Committee on Ways and Means, U.S. House of Representatives, on Investigation No. 162, USITC, Publication 1517, April 1984.

2/ Jean-Claude Trichet, "ATR42 Progress Report," Commuter World, May-June 1985, p. 13.

3/ "The Mystere Falcon Family," Interavia, May 1985, p. 486.

4/ Kozo Hirata, ed., Aerospace Industry in Japan, 1981, p. 3.

5/ "Chance for Real 'Take-Off' Emerges With Rising Defense, Civilian Production," Industrial Review of Japan, March 1983, p. 74.

6/ Interavia, October 1983, p. 1093.

subsidiary of MHI and operated an assembly plant in San Angelo, TX. 1/ Company officials state that this arrangement allowed the company to build a significant dollar content into the final price and to facilitate demonstration and delivery procedures. Mitsubishi estimated that more than 60 percent of the aircraft's parts, material, and labor are of U.S. origin. Turboprops and jets are built in the United States from airframes manufactured at MHI's plant in Nagoya, Japan. 2/ In December 1985, the Diamond II business jet program was purchased by Beech Aircraft Corp. Beech will assemble the aircraft in kits provided by Mitsubishi Heavy Industries, and market it outside Japan. MHI announced that the firm will end production of the Diamond I, Marquis, and Solitaire, and will discontinue all general aviation operations outside Japan by March 31, 1986. 3/

Since the 1960's, when it began selling the MU-2 turboprops (Marquis and Solitaire), MHI produced 758 units of which 57 were sold domestically and the remainder, exported to 26 countries. MHI also produced the MU-300 (Diamond), Japan's first corporate jet. Since 1982, MHI exported 78 unfinished units to its U.S. facility to be completed. Of those 63 were Diamond I's, 11 Diamond IA's, and 4 Diamond II's. 4/

Mitsubishi's total production, capacity, and capacity utilization for 1982 and 1983 are shown in the following tabulation: 5/

	1982	1983
Production---(units)--	783	800
Capacity-------do-----	796	830
Capacity utilization (percent)--	98.4	96.4

In 1980, the firm's production area totaled 106,000 square feet. 6/ During 1982-83, production increased by approximately 7 percent. Data are not currently available for other years.

As of March 1984, MHI employed 6,226 workers at its Nagoya aircraft manufacturing plant, which produces not only aircraft, but also space-related accessories. 7/ Company employment in the United States was about 300 persons in 1984, with the U.S. payroll at the facility in Texas totaling $10.8 million. 8/

1/ Orit Frenkel, "Flying High: A Case Study of Japanese Industrial Policy" Journal of Policy Analysis and Management, 1984, p. 5.

2/ Report from U.S. Embassy, Tokyo, April, 1985

3/ "Speculation Over, Beech Acquires Mitsubishi Bizjet," General Aviation News, Dec. 9, 1985, p. 1.

4/ "Oriental Biz-jet with a Western Accent," Air International, June 1982, p. 268, and "Jetless Beech, Jetless No More," Aviation Internation News, Jan. 1, 1986, p. 3.

5/ Data provided by officials of Mitsubishi Aircraft International, Inc.

6/ Ibid.

7/ Report from U.S. Embassy, Tokyo, April 1985.

8/ Production and assembly operations at the Texas facility stopped in December 1985 following the purchase of the Diamond II program by Beech Aircraft Corp.

MHI had an investment plan of $16.4 million for aircraft production equipment at its Nagoya aircraft manufacturing plant, which was completed in June 1985. Data regarding capital investment at the Texas assembly facility are not currently available.

In the mid-1960's, Japan's aircraft industry was targeted for development along with steel, autos, and other industries, which were thought to be essential to Japan's economic and national security. The Government developed a plan calling for a series of joint ventures with U.S. and European aerospace firms in order to acquire technology, to improve access to scarce material, and to widen their access to foreign markets. Some of the joint ventures that Japan has entered into include the following: 1/

Year	Type of aircraft	Foreign partner
1958	YS-11, commercial aircraft	United States.
1978	767	Do.
1979	RJ-500 engine for 150 passenger aircraft.	Great Britain.

Only one of these aircraft, the YS-11, was utilized for commuter airline use.

Japan is thought to lag behind foreign aircraft manufacturers in technology for several reasons: the 7-year period between 1945 and 1952, when all aircraft production ceased; the pattern of building aircraft under joint license agreements instead of developing indigenous designs; and the inadequacy of R&D facilities and capabilities. Exact figures on industry research and development expenditures are not currently available.

North America is overwhelmingly Japan's largest market for all models of Mitsubishi's business aircraft, with 84 percent of total exports being shipped to that area as of December 31, 1984 (table F-7). Europe and South America were also very important markets in this period.

1/ Orit Frenkel, "Flying High: A Case Study of Japanese Industrial Policy," Journal of Policy Analysis and Management, 1984, pp. 8-12.

Table F-7.--Number of Mitsubishi's exports of business aircraft, by types and regions, as of Dec. 31, 1984

Region	Marquise	Solitaire	Diamond
North America	288	292	60
Europe	23	12	8
Asia	0	1	0
Middle East	0	1	1
Africa	6	3	0
Central/South America	31	26	1
Oceania	7	2	1
Total	335	337	71

Source: Interavia, October 1983, p. 1094.

Government involvement

The Ministry of International Trade and Industry, which is responsible for setting Japanese industrial policies, has selected aerospace as a strategic industry for long-term economic development. 1/ The Japanese Government views the aircraft industry as being important because of the ramifications it has for other high-technology sectors. Within MITI, the Machinery and Information Industries Bureau is charged with developing strategies for promoting "knowledge-intensive industries." Within that Bureau, the Aircraft and Ordinance Division is responsibile for planning strategy for the aircraft industry. Various consultative bodies link the Government with the private sector.

Joint precommercial activities, such as research and testing, have been instrumental in exploring new technologies, developing prototypes, and in perfecting processing techniques. The Government has been involved in several joint commercial programs starting with the Nihon Aircraft Manufacturing Co. in 1959 (which produced the YS-II), which served as a prototype for joint public-private participation and aircraft development programs such as the Civil Transport Development Corporation (CTDC) and the Engineering Research Association for Aero-Jet Engines (ERAEE). 2/

Direct Government financial assistance to the Japanese aerospace industry takes the form of both grants and loans or "hojokin." Hojokin is translated as "subsidy," but actually is zero-interest financial assistance to be repaid once a program becomes profitable. There is also a direct aid program in which the industry receives a commission payment from a Government agency for long-term R&D projects. Under this arrangement, no payback is required, except for a user fee. No Government financing is provided once commercial production begins. Government assistance, however, has been concentrated in

1/ Orit Frenkel, "Flying High: A Case Study of Japanese Industrial Policy," Journal of Policy Analysis and Management, 1984.

2/ U.S. Department of Commerce, International Trade Administration, Japanese Industrial Policies and the Development of High-Technology Industries: Computers and Aircraft, February 1983, pp. 28-33.

large transport aircraft and engines. Data provided by the United States Trade Representative indicate that neither production nor development subsidies for general aviation aircraft is currently provided in Japan. Japanese industry sources confirm that "no financial support or indirect subsidies are received from MITI or Japanese-owned banks." 1/

Export credits for aircraft are granted in the form of loans from the Exim Bank of Japan and private bank loans, which cover a maximum of 85 percent of the total export price. The Exim Bank loans account for about 60 percent of the total loans, and these are repayable in 5 years at an 8.3-percent annual interest rate in accordance with OECD guidelines. MHI has received loans from both the Eximbank of Japan and the Japan Development Bank. However, the loans cannot be traced solely to business aircraft since MHI is diversified into many areas including shipbuilding, power-generating equipment and engineering. There is no established program for exporting complete aircraft, since no such demand exists at present. 2/

MITI has recently made the decision to send a high level Government working group to China to study the joint design and development of a 30-40 passenger commuter aircraft. The Government expects development costs to total $297 million to $396 million, with approximately 600 aircraft to be produced by production lines in both countries. The project is to be completed by the end of 1986. 3/

Brazil

Industry profile

Empresa Brazilia de Aeronautica S.A. (Embraer) is the only Brazilian manufacturer of general aviation aircraft. The administrative offices, as well as facilities for research and development, engineering, and production, for Embraer's turboprop aircraft are located at San Jose dos Campos, Brazil. Neiva S.A., Embraer's wholly owned subsidiary, is located in Botucatu and produces light piston general aviation aircraft for domestic use only under a 1974 industrial cooperative agreement with Piper aircraft. 4/

Embraer has engaged in a variety of civil and military programs in the past 15 years, demonstrating increasing technological capabilities and achieving considerable success in the export market. In particular, Embraer designed an inexpensive, fuel-efficient turboprop (the Bandeirante) for the commuter market, taking advantage of market opportunities for turboprops following the oil crisis in 1973. 5/ Although Embraer has emerged rather rapidly as a competitor in the international aircraft industry, Brazil has a

---

1/ Correspondence from Mitsubishi Aircraft International, July 1985.
2/ Ibid., April 1985.
3/ "Japan, China Consider Development of New Commuter Transport," Aviation Week & Space Technology, Dec. 2, 1985, p. 33.
4/ Report from U.S. Embassy, Sao Paulo, February 1983.
5/ "Bandeirante: Embraer's New Commuter," Flight International, July 30, 1983, p. 254.

long history of aircraft design and manufacturing. 1/ Before Embraer was founded in 1969, several efforts were made to create a Brazilian aeronautical industry. Most of the series aircraft produced in Brazil during the 1930's and 1950's were trainers for military and civil applications. In 1941, however, the Brazilian Government established the Ministry of Aeronautics to assume responsibility for both civil aeronautics and the Brazilian Air Force. In 1946, the Ministry of Aeronautics created the Aeronautics Technical Center (CTA) and its associated engineering school, the Instituto Technologico de Aeronautica (ITA). CTA worked on designs for several conventional planes, that were largely unsuccessful during its early years. It was not until 1965 that a prototype of the Bandeirante was begun, designed to provide an alternative to the larger jets. 2/

Embraer currently produces three aircraft for business and commuter use, the Bandeirante, Brazilia, and the Xingus. The basic version of the Bandeirante is a twin-turboprop, 18-passenger commuter plane that costs approximately $1.9 million. The Bandeirante entered into service in the United States in 1979. 3/ Company officials indicate that in 1985, there were 450 Bandeirante in operation in 28 countries. 4/ Embraer has invested heavily in developing a new 30-passenger, pressurized commuter plane, the Brazilia, which sells for $4.7 million. All of the Brazilia's airframe is built at the San Jose dos Campos factory. About 40 to 45 percent of its value is made in Brazil, and the engines, avionics, undercarriage, hydraulics are imported. Embraer hopes to capture 30 percent of the market for 30 to 40 seats with the Brazilia. 5/ In July 1985, when it received FAA certification, Embraer held 45 firm orders and paid options to another 111 Brazilia aircraft. 6/ The aircraft was first delivered to U.S. customers in August 1985. The Xingu, an eight-passenger business turboprop, entered into production in 1979. It was Embraer's first venture into the pressurized field but was not very successful. Only about 110 were sold and, as of April 1985, production on Xingu had slowed considerably. The company was still willing to accept orders but is contemplating closing the production line. 7/

As of February 1985, more than 450 Bandeirantes had been built. The production rate at that time was four Bandeirante per month. 8/ Embraer officials indicate that production has declined to 1 per month by September 1985. According to table F-8, total production declined by 85 percent, from 71 in 1980 to 10 in 1984. Production of the Bandereinte accounted for 73 percent of the Embraer's total aircraft manufacture in 1980 and 90 percent in 1984. However, actual delivery of this aircraft fell from 52 in 1980 to 9 in 1984, as production slowed in anticipation of the startup of the new

---

1/ Richard W. Moxon, Thomas W. Roehl, and J. Frederick Truitt, University of Washington, Emerging Sources of Foreign Competitions in the Commercial Aircraft Manufacturing Industry, June 1985.

2/ David Godfrey, "Embraer Sets A Course to Diversity," Commuter Air, February 1985, p. 38.

3/ Richard W. Moxon, Thomas W. Roehl and J. Frederick Truitt, op. cit.

4/ Report from U.S. Embassy, Sao Paulo, April 1985.

5/ Embraer News, February 1985.

6/ "Brazilia: Embraer's New Commuter," Flight International, July 30, 1985.

7/ Aviation Week & Space Technology, July 15, 1985, p. 27.

8/ David Godfrey, "Embraer Sets A Course to Diversity," Commuter Air, February 1985.

Brazilia production line. Production capacity for the Bandeirante is approximately 24 units per year, but company officials indicate that it could be increased if demand should warrant it. 1/ During this same period, production of the Xingu dropped from 19 aircraft in 1980 to 1 in 1984.

Table F-8.--Embraer: Production of aircraft, by types, 1/ 1980-84

Type	1980	1981	1982	1983	1984
Bandeirante	52	57	34	19	9
Xingu	19	13	10	3	1
Total	71	70	44	22	10

1/ During 1980-84, production from Embraer's wholly owned subsidary Neiva, which includes 6 lines of aircraft, totaled 669 aircraft.

Source: Report from U.S. Embassy, Sao Paulo, April 1985.

Data on production of the Brazilia is not currently available. However, the first production unit of the Brazilia was delivered in August 1985. The initial production rate will be two aircraft per month, increasing to three per month by mid-1986. 2/

The following tabulation shows Embraer's total workforce from 1980 through 1984. Employment rose by over 28 percent, from 5,957 in 1980 to 7,645 in 1984, as shown inthe following tabulation:

Year	Total employees
1980	5,957
1981	5,414
1982	6,732
1983	6,877
1984	7,645

It is estimated that approximately 50 percent of the firm's total employees work in production of commuter or business aircraft and one-quarter of the company's workforce is employed in the engineering department. 3/ Embraer had a total of 7,800 employees as of June 1985. 4/

Embraer has a wholly-owned U.S. subsidiary, Embraer Aircraft Corp. (EAC), in Fort Lauderdale, Fl. This facility has a construction area of 9,000 square feet, with a work force of approximately 55 persons. U.S. technical support of Brazilian-built aircraft, including spare parts sales, are conducted from this facility. Training of pilots and mechanics for U.S. operators is also

1/ Ibid.
2/ Data provided by Embraer officials, August 1985.
3/ Report from U.S. Embassy, Sao Paulo, April 1985.
4/ Data provided by Embraer officials, August 1985.

done by EAC. Since 1980, EAC has invested $2.6 million in real and personal property in the United States. The firm is currently initiating an $11 million expansion of this U.S. facility. 1/

Embraer has been able to draw upon a steadily expanding pool of aeronautical experts from the ITA and the state of San Paulo, which contains Brazil's largest pool of skilled labor. 2/ Production personnel were originally acquired from the metalworking industry, but Embraer, which states that the firm spends more on training than most aircraft manufacturers, trained most of them. Approximately 18 percent of Embraer's workforce is college educated, and the average employee is 34 years old. 3/

The average wages for Embraer's production workers in 1984 were approximately $210 to $240 per month; such wages are based on a 48-hour week. 4/ Although labor costs are lower for Brazil than for Europe or North America, Brazilian officials indicate that this advantage is diminished because of lower productivity and high social obligations imposed on the industry. 5/

The following tabulation indicates that Embraer's capital expenditures for land, building, and equipment, increased by 85 percent, from $45 million in 1980 to $84 million in 1984. 6/

Year	Capital expenditures (1,000 dollars)
1980	45,460
1981	60,590
1982	70,002
1983	56,261
1984	83,820

The largest increase in capital expenditures occurred between 1983 and 1984, when they rose by almost 50 percent. This was primarily due to construction of new production facilities for Embraer's military program and the Brazilia. Additionally, the installation of high-technology, U.S.-built machine tools occurred in late 1984.

According to the following tabulation, research and development expenditures by Embraer increased by 220 percent, from $15 million in 1980 to $49 million in 1984. 7/

1/ Embraer submission, Oct. 25, 1985.

2/ David Godfrey, "Embracer Sets a Course To Diversity," Commuter Air, February 1985, p. 38.

3/ Embraer submission, Oct. 25, 1985.

4/ Exact figures for the 5-year period are not available.

5/ "Brazilia, The Capital Commuter," Air International, November 1983, p. 218.

6/ A separate data breakdown for commuter and business aircraft is not available. Report from U.S. Embassy, Sao Paulo, April 1985.

7/ Embraer Annual Report, 1984.

Year	Research and development (1,000 dollars)
1980	15,256
1981	31,501
1982	21,120
1983	29,697
1984	48,769

In 1984, research and development costs for the Bandeirante totaled $9 million, and $16 million was spent on the Brazilia. 1/ Total development costs for the Brazilia have been close to $300 million. According to Brazilian industry officials, Embraer is in the process of asessing new projects that would require significant investments, including an improved version of the Bandeirante. 2/

Embraer's total sales rose from $172 million in 1980 to $182 million in 1984. Net income for the firm totaled $1.3 million in 1982. The firm's profitability has declined annually since 1982, with net income falling to $1.1 million in 1983 and $1.0 million in 1984. 3/

In August 1974, Embraer signed an agreement for industrial cooperation with Piper Aircraft Corp. providing for licensed manufacturing of general aviation aircraft in Brazil. By 1976, Embraer was producing four different single-engine and two-engine piston-powered models types. Embraer currently produces six models for general aviation use at its subsidiary, Neiva, S.A. 4/ The firm is also presently involved with Short Brothers PLC, of Northern Ireland, in the production of a trainer aircraft to be used by the British Royal Air Force. This cooperative venture began in 1984. Embraer is also engaged in manufacturing a fighter aircraft (AM-X Strike Fighter) with Aeritalia of Italy.

Government involvement

The Brazilian Government has strongly supported the development of an indigenous aircraft for three reasons--to achieve an independent national defense capability, to encourage the upgrading of the country's independent technological capabilities, and to improve the balance of payments. Brazil has emphasized the development of independent aircraft programs rather than licensing the designs of existing planes. The CTA has also encouraged the local manufacture of aircraft parts and materials. 5/

The Presidential decree that established Embraer in 1969 bestowed several privileges on the aircraft company. First, all agencies directly or indirectly owned by the Brazilian Government were to give priority to the use of production or services offered by Embraer. Secondly, it exempted Embraer from paying taxes and duties on imports of raw materials, parts, components and equipment. Thirdly, a fiscal incentive scheme was set up to attract

1/ Embraer Annual Report, 1984.
2/ Report from U.S. Embassy, Sao Paulo, April 1985.
3/ Ibid.
4/ General Information Brazilian Aeronautical Industry, 1984.
5/ Richard Moxon, Thomas W. Roehl, and J. Frederick Truitt, op. cit.

private capital to the Embraer venture. Under this plan, Brazilian corporations could invest up to 1 percent of the income tax they owed to the Federal Government each year in Embraer shares. This scheme was initally set up for a 5-year period ending in 1975 but was extended until 1985. 1/ The fiscal incentive scheme reportedly has yielded Embraer significant amounts of low-cost capital, equaling $20 million annually. 2/ The company has also benefitted from an over-rebate of the Industrial Product Tax. 3/

Through a divestiture scheme, the Government's total share of equity was reduced from 82 percent to less than 6 percent by the end of 1984. 4/ The Government's share of voting stock has also decreased, from 57 percent in 1969 to 54 percent in 1984. Although private investors are represented on the board of directors, the Government must approve major decisions. 5/

The Ministry of Aeronautics is in charge of all civil and military aviation in Brazil, controlling both the Air Force, civil aviation authorities, and Government-owned aircraft manufacturers. 6/ Military sales are important to Embraer, as almost 25 percent of the orders for the Brazilia are for military customers. 7/ Defense orders allow development and production costs to be spread over a greater production volume and allows lower costs. The Air Ministry also assists in aeronautical research. 8/

The Government of Brazil is also involved in research and development for the aerospace industry, and has been even before the founding of Embraer. In 1954 a number of aerospace engineers were trained at government expense at the the Aerospace Research Center (CTA). 9/ The Government-run CTA today is a multifaceted company divided into four major institutes. The Technical Aeronautical Institute (ITA) is basically an aeronautical engineering university; the Research and Development Institute (IPD) performs research and shares its results with both Government-owned and private companies; the Institute for Space Activities conducts research similar to the U.S. National Aeronautics and Space Administration; and the Institute for Industrial Coordination and Growth (IFI) works to stimulate the aerospace industry. 10/ Embraer is known to work closely with the ITA and IPD, however, their relationship with the IFI is not available.

1/ Ravi Rammurti, "Embraer," Harvard Business School, 1982.
2/ Report from U.S. Embassy, Sao Paulo, April 1985.
3/ Richard Moxon, Thomas W. Roehl, and J. Frederick Truitt, op. cit.
4/ General Information Brazilian Aeronautical Industry, 1984.
5/ Richard W. Moxon, Thomas W. Roehl, and J. Frederick Truitt, op. cit.
6/ Ibid.
7/ David Velupillai, "Brazilia: Embraer's New Commuter," Flight International, July 30, 1983, p. 255
8/ James Bauchspies and William E. Simpson, Research and Technology Program Perspectives For General Aviation and Commuter Aircraft, September 1982.
9/ U.S. International Trade Commission, Foreign Industrial Targeting and Its Effects on U.S. Industries, Phase III: Brazil, Canada, The Republic of Korea, Mexico, and Taiwan, Report to the Subcommittee on Trade, Committee on Ways and Means, U.S. House of Representaitives, . . ., Publication 1632, January 1985.
10/ John Hoyt Williams, "Aerospace Booms in Brazil," Air Force Magazine, June 1985, p. 117.

The Brazilian Government is also involved in both export promotion and financing. The Government of Brazil is involved mainly in promoting industrial exports through the BEFIEX program. One of the main objectives of the BEFIEX program is "to make use of the potentialities set by the government's economic policies." Export financing is conducted through the Central Bank of Brazil (Banco do Brazil). Through an export-financing fund (Finex), this organization provides U.S. dollar financing either directly through the Banco do Brazil or indirectly through private banks. Finex also funds overseas promotional and marketing activities, including defraying some of the costs of advertising, participation in trade fairs, and foreign-market research. 1/ The Brazilian government has provided export financing in the range of 7.5 to 10 percent for the Bandeirante; the Government also provides low-cost financing for production, grants tax credits to stockholders, as well as for exports and foreign profits; and provides research and development funding. 2/

Netherlands

Industry profile

Fokker BV in Amsterdam is the only Dutch aircraft manufacturer. It is a privately owned company in which the Government holds no financial interest. Fokker's production line of commuter aircraft includes the Fokker F-27 and the Fokker F-28. The Fokker F-27, a 50-seat turboprop aircraft, has been produced since 1956 in eight different configurations, including both civilian and military versions. This aircraft is gradually being phased out of production. The Fokker F-28 has been produced since 1969. This turbofan aircraft seats 65 to 85 passengers.

The Fokker-50, a modernized version of the F-27, has recently been launched with the first aircraft slated for delivery in late 1986 or early 1987. 3/ The plane will be priced at about $7 million compared with $6.0 million to $6.5 million for the most advanced F-27's. 4/ The breakeven level for the Fokker 50 is likely to be in the range of 125 to 250 aircraft, since it is a derivative aircraft. As of the end of August 1985, the company had received 32 firm orders for the model. 5/ The company also recently launched the Fokker-100. This plane, being developed as a modernized version of the F-28, will carry 100 passenger on medium-haul routes. Company officials indicate that the F-100 will sell for approximately $14 million, with initial deliveries beginning in mid-1987. Fokker has estimated a market for 300 F-100's at an initial production rate of 36 per year. 6/ Even though the

---

1/ U.S. International Trade Commission, Foreign Industrial Targeting and Its Effects on U.S. Industries, Phase III: Brazil, Canada, The Republic of Korea, Mexico, and Taiwan, Report to the Subcommittee on Trade, Committee on Ways and Means . . ., Pub. 1632, January 1985.

2/ General Information Brazilian Aeronautical Industry, 1984.

3/ Report from U.S. Embassy, The Hague, April 1985.

4/ "Fokker 50 and 100 Programs Entail $350 Million Development," Commuter/Regional Airline News, Jan. 30, 1984.

5/ Aviation Week & Space Technology, Aug. 26, 1985.

6/ Michael Feazel, "Fokker Improves Transport Design Based on Launch Customer Demand," Aviation Week & Space Technology, Sept. 16, 1985, p. 45.

F-100 is a successor to the F-28, company officials indicate that production of the F-28 will continue as long as there is sufficient demand. 1/

Production of civil aircraft remained relatively steady during 1980-81 at 34 aircraft but dropped by 82 percent, to 28 aircraft, in 1984 (table F-9). Although original production plans called for 16 aircraft to be manufactured, only 11 F-27's were produced in 1984. Production of the F-28 remained fairly constant during 1980-84, except for a decline from 19 aircraft in 1981 to 10 in 1982. Overall company capacity utilization ranged from a high of 72 percent in 1980 and 1981 to a low of 55 percent in 1982.

Table F-9.--Civil aircraft: Fokker's production and capacity utilization, by types, 1980-84

Item	1980	1981	1982	1983	1984
Production:					
F-27----------number--	15	15	16	13	11
F-28----------do----	19	19	10	19	17
Total----------do----	34	34	26	32	28
Capacity:					
F-27----------do----	23	23	23	23	23
F-28----------do----	24	24	24	24	24
Total----------do----	47	47	47	47	47
Capacity utilization:					
F-27----------percent--	65	65	70	57	48
F-28 (percentage)--do----	56	56	42	79	71
Average----------do----	72	72	55	68	60

Source: Report from U.S. Embassy, The Hague, April 1985.

The total number of workers engaged in aircraft production at Fokker reached a peak of 9,706 in 1981 and then declined annually to 8,000 workers in 1984 (table F-10). The number of production workers for the F-27 climbed from 1,680 to 2,500 in 1982, or by 48 percent, before dropping to 1,500 in 1983. Employment remained steady through 1984.

1/ Ibid.

Table F-10.- Employment by Fokker, by types of aircraft, 1980-84

Type	1980	1981	1982	1983	1984
F-27	1,680	1,900	2,500	1,500	1,500
F-28	2,216	2,427	2,381	2,100	2,000
Total	8,862	9,706	9,527	8,398	8,000

Source: Report from U.S. Embassy, The Hague. April 1985.

As shown in the following tabulation, total wage costs for Fokker fell from $202 million in 1980 to $146 million in 1984, or by 28 percent. Company officials attribute this decrease to the rise in the value of the dollar compared to the value of the guilder. Hourly wages fell by 22 percent during this period, as shown in the following tabulation:

	1980	1981	1982	1983	1984
Total wage costs (in millions of dollars	202	179	193	163	146
Hourly wages (dollars)	7.56	6.53	6.78	6.51	5.93

Capital expenditures followed an irregular pattern between 1980 and 1984 (table F 11). In 1982, capital expenditures reached a peak of approximately $25.1 million and then dropped by 62 percent, to $9.5 million, in 1983. The following year, such capital outlays climbed by 65 percent, to $15.7 million.

Table F-11.--Fokker's capital expenditures, by types, 1981-84 1/

(In thousands of dollars)

	1981	1982	1983	1984
Land and buildings	9,392	23,817	2,716	3,669
Machinery and equipment	2,998	5,498	1,111	1,634
Other fixed assets	8,424	7,343	3,632	5,038
Private houses	91	75	-	83
Fixed assets under construction	2,805	11,757	2,047	5,287
Unused land	-	205	-	-
Total	23,711	25,101	9,506	15,711

1/ Figures for 1980 are not available.

Source: Report from U.S. Embassy, The Hague, April 1985.

Research and development expenditures totaled $24.3 million in 1980 and $20.0 million in 1981 (table F-12). These expenditures then almost quadrupled from $26.0 million in 1982 to $94.5 million in 1984. Company officials indicated that about 60 percent of Fokker's total R&D expenditures

(Government-subsidized and nonsubsidized) have been devoted to the Fokker 100 program since 1982, with about 20 percent being allocated to the F-50 program. The remainder were dedicated to other ventures in the military and space area.

Table F-12.--Fokker's research and development expenditures, 1980-84

(In thousands of dollars)

	1980	1981	1982	1983	1984
Fokker R&D	12,557	9,990	12,922	13,868	12,337
Government assisted R&D	12,000	10,000	13,000	14,000	82,200
Total	24,257	19,990	25,992	27,868	94,537

Source: Report from U.S. Embassy, The Hague, April 1985.

Fokker's total sales were irregular between 1980 and 1984. Sales fell slightly (5 percent) between 1980 and 1983 and then rose to a high of $538 million in 1983. Between 1983 and 1984, however, total turnover rose by 2 percent, to $487 million. Sales under the F-27 and F-28 programs accounted for between 82 and 85 percent of total turnover during 1980-84. Data also indicate that Fokker reported a loss of $4 million in 1982 as a result of interest charges on financing large inventories caused by delayed or canceled aircraft orders. Fokker's financial status improved, however, in 1984 with a profit of $7.3 million.

Fokker supplies the wings to Short Brothers of Northern Ireland for the various Shorts 330 models and the 360. The development costs of the Fokker 100 are in fact being covered under a risk-sharing agreement with Short Brothers, the Belfast-based commuter aircraft manufacturer. Shorts is investing $43 million in designing, developing, and producing the model 100 wing. 1/ MBB, of West Germany, also builds the fuselage, barrel sections, rear fuselage, and tail for the F-28. 2/ Fokker is also involved in the Airbus consortium through the production of moving parts for the A300 and A310 wings. Fokker receives funds from the Government for the development of these components. The firm is also a member of the trans-Atlantic industrial F-16 consortium. It provides midfuselages, wing part sets, main landing gear doors and carbon fiber tail parts for the F-16 to assembly lines in Belgium and the United States. 3/

1/ "New Fokker Airlines Get Government Green Light," Interavia, May 1983, p. 411.

2/ U.S. International Trade Commission, Assessment of the Effects of Barter and Countertrade Transactions on U.S. Industries, Publication 1766, October 1985.

3/ Report from the U.S. Embassy, The Hague, April 1985.

Government involvement

Fokker receives interest-free loans and credit guarantees from the Government under a "rotating fund" arrangement. 1/ The rotating fund was set up during the 1960's as part of the financing package for the F-27 and F-28. According to this scheme, Fokker countributes royalties on sales of aircraft after the breakeven point has been reached. The Government of the Netherlands had received no royalties on sales of the F-28 as of April 1985. During 1983-85, the Dutch Government has provided about 900 million guilders (US$280 million) in development funds for Fokker, consisting of a credit guarantee of $140 million and an interest-free loan of $140 million. This will aid in financing the development of the Fokker 50 and 100, which together will cost about $312 million. 2/ In February 1986 it was announced that Fokker will receive another $36.8 million to finance development of its Fokker 50 and 100 aircraft. 3/

The Netherlands Agency for Aerospace Programs (NIVR) was established in 1946 to oversee Government policy for the aerospace industry. The agency is governed by a board of 16 members consisting of representative from Government, industry, the research community, and purchasers of aerospace equipment. The NIVR's major responsibility is to advise the Government on the feasibility of new project proposals. The agency administers Government funds and collects royalties on sales, a portion of which are reinvested. The NIVR has been involved with both the F-27 and the F-28. Recently the NIVR reviewed proposals for the F-50 and 100 and is reportedly planning for new technology programs to support these aircraft. 4/ Regarding export promotion, the Government of the Netherlands provided subsidies for part of the company's participation in trade shows during 1980-82. These subsidies ended in 1983, however, after a change of Government. Like many other developed countries, Dutch embassies in third markets also provide marketing assistance. 5/ Public data regarding Dutch Government financing assistance for Fokker aircraft are not available. The Central Bank of the Netherlands (de Nederlandsche Bank) reportedly provide partial financing for aircraft purchasers in dutch guilders rather than U.S. dollars. Industry sources note that this allows these loans to be at lower interest rates than available from commercial banks.

1/ Ibid.

2/ Ibid., and "Making Fokker a Force to Be Reckoned With," Interavia, October 1985, p. 1163. Fokker will contribute $32 million, and MBB of West Germany will provide 27 percent of the financing in the form of loans and guarantees. The 394 million dollars' worth of development costs can be itemized as follows:

35 percent - development of the Fokker 50;
41 percent - development of the Fokker 100; and
24 percent - tooling and producing preparation.

3/ "News Digest," Aviation Week & Space Technology, Feb. 10, 1986, p. 34.

4/ "Promoting Aerospace in Holland," Interavia, April 1984, p. 387.

5/ "Governments' Attitudes on Exports Vary," Aviation Week & Space Technology, Sept. 3, 1984, p. 113.

Spain

Industry profile

The Spanish aerospace industry is involved in almost every aspect of aviation, including building airframes, engines, equipment, and selected spacecraft components. Spanish aviation can be segmented into domestic and foreign contract military maintenance programs, the design and manufacture of Spanish aircraft, and participation in international cooperative programs.

The major producer of aircraft in Spain has historically been Construciones Aeronautics SA (CASA). CASA, founded in 1923 as a licensed manufacturer of French and German aircraft for the Spanish Air Force, arrived at a position of virtual dominance over the Spanish aerospace industry when it merged under Government auspices in 1972 with Hispano Aviacion and ENMASA. Aeronautica Industrial SA (AISA) is the only other aircraft manufacturer in Spain. It does not at present produce any aircraft, but relies instead on subcontracts and maintenance. The remainder of the industry is divided between equipment companies specializing in electronics and subcontractors producing components. 1/

Approximately 71.6 percent of CASA's share capital is held by the State holding company, Instituto Nacional de Industria (INI). 2/ INI is a quasi-Government body founded in 1941 to promote and finance the establishment and development of Spanish industries. Spanish Government officials indicate that INI is principally responsible for the efficient management of the companies in which it holds a share. Approximately 13 percent is held by the U.S. aerospace manufacturer, Northrup, and 11 percent, by the West German firm MBB. 3/

CASA is presently one of Western Europe's largest aerospace companies. Its most successful civilian aircraft has been the C-212 (Aviocar). The C-212 is a high-wing twin turboprop with STOL capability, powered by two turbine engines. This plane is a light transport designed to seat between 26 and 28 passengers. Since its introduction in 1971, there have been repeated updates of the C-212 including over 12 special military versions. Company sources state that the C-212 has been sold to 34 airlines and governments since its introduction in 1971. There were 34 aircraft flown by operators in mid 1985. 4/

CASA operates four major production facilities, located in Madrid (Getafe and Ajalvir), Seville (Tablaca, San Pablo) and Cadiz. However, aircraft assembly takes place in only Madrid and Seville. The Cadize facility serves as a major machine shop and parts subassembly operation.

1/ Report from the U.S. Embassy, Madrid, May 1984.

2/ "The Spanish Aerospace Industry - A Will to Win Through Co-operation," Interavia, February 1983, pp. 136-140.

3/ Anthony Vandyk, "Market-Wise Casa Links Future to Burgeoning Commuters," Commuter Air, June 1982.

4/ Data provided by CASA officials, June 3, 1985.

Employment at CASA increased annually during 1980-83 (table F-13). In 1983, the number of persons employed totaled 9,836, representing a 19-percent increase over the 1980 figure. Wages paid increased annually from 10,015 million pesetas (US$97.5 million) in 1980 to 19,487 million pesetas (US$122.8 million) in 1983. Data are not available regarding employment and wages paid in 1984.

Table F-13.--CASA's employment and wages, 1980-83

Item	1980	1981	1982	1983
Employment	8,270	8,896	9,622	9,836
Wages paid million pesetas	10,015	12,574	15,964	19,487
Wages paid million dollars	100.5	104.9	115.6	122.8

Source: CASA Annual Report '83, and International Monetary Fund, International Financial Statistics, 1984.

CASA's Seville assembly lines are able to produce approximately 4-1/2 planes per month. 1/ Production currently, however, is less than 2 per month. 2/ CASA's annual C-212 shipments during 1980-83 are shown in the following tabulation:

Year	Production	Shipments	Shipments to Indonesia
1980	70	27	11
1981	30	18	12
1982	50	37	13
1983	48	42	17

Shipments to Indonesia represent unassembled aircraft in different stages of production. Licensed C-212 production in Indonesia began in 1974. In terms of work hours, 60 percent of these aircraft are Indonesian content.

Total sales of aircraft and aerospace components increased annually from 11.3 billion pesetas (US$130 million) in 1980 to 39.6 billion pesetas (US$249.5 million) in 1983. Export sales are a very important component of CASA's total income. Export sales accounted for approximately 56 percent of total sales in 1979 and 70 percent in 1983. Annual aerospace activities by CASA during the 1979-83 are shown in the following tabulation (data are not currently available for 1984): 3/

1/ Ibid, p. 2.
2/ "CASA Plans To Win 'The Second Round'", Commuter Air, August 1985.
3/ CASA Annual Report '83, and International Monetary Fund, International Financial Yearbook, 1984.

Year	Total sales billion pesetas	Total sales million dollars	Domestic sales billion pesetas	Domestic sales million dollars	Exports billion pesetas	Exports million dollars
1979--	11.3	130.3	5.0	57.7	6.3	72.6
1980--	16.8	180.0	7.7	82.5	9.1	97.5
1981--	24.5	225.1	8.9	81.8	15.6	143.3
1982--	34.0	280.3	8.7	71.7	25.3	208.6
1983--	39.6	249.5	11.9	76.6	27.7	180.7

Aerospace sales at CASA were divided between the C-212 military and civilian transport, the C-101 Aviojet military jet trainer, other aerospace manufacturing, maintenance, and nonaeronautic activities. The C-212 accounted for 25 percent of CASA's sales, and the C-101 accounted for another 21 percent during the 5-year period. However, other aerospace manufacturing activities constitute the largest percentage of CASA's sales by products. The manufacture of parts for companies such as Boeing, McDonnell-Douglas, Airbus Industrie, Dassault-Breguet, and the European Space Agency accounted for 42.2 percent of CASA's sales during 1979-83.

The following tabulation shows that investments in tangible assets at CASA increased irregularly from 1,416 million pesetas (US$15.1 million) in 1980 to 4,069 million pesetas (US$25.6 million) in 1983:

Year	Investments in tangible assets million pesetas	Investment in tangible assets 1,000 dollars
1980	1,416	15,171
1981	1,577	14,489
1982	1,909	15,738
1983	4,069	25,637

Industry sources indicated that investments increased during this period primarily because of CASA's efforts to raise the company's general technological level and its investments in new production facilities. 1/

A major portion of CASA's research and development efforts have been directed towards the development of the CN-235 commuter aircraft. The CN-235 is being built as a joint venture with P.T. Nurtanio of Indonesia originating from 1979. Each company provided $40 million as an initial investment in the project. CASA officials state that the CN-235 is the first major Spanish aircraft project not to be funded by the Government.

CASA reported that before-tax profits increased annually from 125 million pesetas (US$1.4 million) in 1979 to 910 million pesetas (US$7.5 million) in

1/ CASA Annual Report, various years, 1979-83.

1982 before declining to 469 million pesetas (US$3.1 million) in 1983, as shown in the following tabulation: 1/

Year	Before-tax profits million pesetas	Before-tax profits million dollars
1979	125	1.4
1980	310	3.3
1981	536	4.8
1982	910	7.5
1983	469	3.1

Company sources note that profits declined in 1983 principally because of CASA's difficulty in obtaining sales because of inadequate financing and because of the need to service outstanding foreign debt loans.

CASA is involved in a variety of international cooperative programs, which accounted for 28.5 percent of CASA's aerospace production in 1981 and 25.6 percent in 1983. The most significant of these is CASA's relationship with P.T. Nurtanio of Indonesia. In 1979, CASA and Nurtanio entered into a 50-50 joint venture known as Aircraft Technology Industries (Airtec), with production facilities in both countries. Airtec's function was to design and manufacture a large, multi-purpose, twin-engine transport capable of performing civilian and military functions. The result was the CN-235 fixed-wing STOL aircraft powered by 2 turboprop engines, with a seating capacity of between 34 and 39 passengers.

Airtec is able to take advantage of Indonesia's lower labor costs, technology and expertise transfers from Spain, shared development costs, and captive domestic markets in both countries. CASA is responsible for supplying the center wing box, center and forward fuselage sections, cockpit, and the undercarriage. Nurtanio will supply the outer wing sections, rear fuselage, and the stabilizers. CASA and Nurtanio will share the responsibilities for sale using distributors in the United States, Australia, and Europe to serve markets outside their home areas. However, the majority of sales are expected to take place within Spain's and Indonesia's home markets. 2/

CASA is also involved in a number of other cooperative programs. The following is a listing of some of the programs in which CASA is active.

1/ Ibid.

2/ "CASA/Nurtanio CN-235 Aircraft Nears," Aviation Week & Space Technology, Mar. 28, 1983, pp. 50-53.

Company	Product	Country/Company
Airbus Industrie	Stabilizers, landing hatches, passenger doors.	France/West Germany, the United Kingdom.
Messerschmitt-Boelkow-Blohm.	BO-105 helicopters	West Germany.
Dassault-Breguet	Wingsets for business aircraft and central fuselage components for the Mirage.	France.
Boeing Commercial Airplane Co.	Ventral stairs, rutter trim tabs, outer wing flaps.	United States.
McDonnell-Douglas	Emergency doors, landing gear hatches, underfairing, access hatches, auxiliary fuel tanks.	------do------
Messier Hispano-Bugatti.	Hatch actuator	Italy.
Ariane	Forward and intertank structures of the first stage, equipment boxes and POGO effect corrector valves.	European Space Agency.
Canadair	Stabilizers	Canada.
Nurtanio	CN-212, CN-235	Indonesia.

Government involvement

As stated earlier, the INI is the majority owner of CASA. The Spanish Government reportedly has funded the development of all CASA's aircraft, with the exception of the CN 235. 1/ This Government organization will spend nearly $1 billion during 1984-88 to increase overall industrial productivity, to increase number of products produced, and to expand export markets for the stated controlled aerospace, defense, shipbuilding, auto, mining, and utilities industries. 2/ CASA's share of this investment is not available.

Company officials note that the Spanish Government has not been involved in U.S. commuter aircraft sales to date. However, CASA sources indicated that recent proposed U.S. tax changes could necessitate the utilization of the Spanish Export Credit Insurance Company (CESCE) and/or the External Bank of Spain to finance sales.

1/ Anthony Vandyk, "Market-Wise CASA Links Future To Burgeoning Commuters," Commuter Air, June 1982.

2/ "Spain to Modernize Aerospace Industry," Aviation Week & Space Technology, Jan. 23, 1984, pp. 93-95.

Government procurement has been an important element in CASA's sales history. There have been 169 military C-212's sold, with a large portion purchased by the Spanish Government. Most recently, the Spanish Post Office purchased two C-212's, and the Spanish Coast Guard bought one. 1/ Data on Government procurement of the CN 235 are not available.

West Germany

After many years of financial constraints and commercial failures, the West German aerospace industry has evolved into one of Western Europe's largest and most dynamic. The industry currently employs 72,000 people, being the fourth largest in the Western world. Since the 1970's, West Germany has been involved in a large number of international aerospace programs, largely through participation in cooperative programs. Industry sources indicate that it has more commitments to multinational ventures (mostly European) than any country in the world.

The sole producer of commuter and business aircraft in West Germany is the privately held company Dornier GmbH. Dornier GmbH was founded in 1922 as a manufacturer of aircraft for the West German Air Force and represents the largest member company of the consolidated Dornier Group. In July 1985, Damler-Benz, the West German automobile manufacturer, acquired 66 percent of Dornier GmbH for approximately $126 million. The West German State of Baden-WuerHemberg owns 4 percent of the firm with Cladius Dornier holding the remaining 20 percent. 2/ Dornier is the second largest overall aerospace organization in West Germany today, behind Messerschmitt-Boelkaw-Bohm GmbH (MBB). MBB produces primarily helicopters and is involved military and large commercial aircraft. There are a number of other very small aerospace companies in West Germany. These firms, however, do not produce any aircraft covered by this study.

In 1979, Dornier GmbH launched the 228 project; a light utility, commuter aircraft. The Do 228-100 seats 15, and the Do 228-200 seats 19. The Do 228 aircraft was derived from the successful Do 2802 Skyservant multipurpose STOL aircraft, but company officials maintain that it contains more advanced technology. Since the aircraft's introduction in 1981, the 228 models have been upgraded to the 228-101 and 228-201.

Dornier GmbH production facilites total five, located in Munich-Neuaubing, Friedrichshafen-Immenstaad, Friedrichshafen-Lowental, Oberpfaffenhofen, and Langenargen. The manufacturing plant at Munich-Neuaubing is where assemblies for civil and military aircraft are produced. At Oberpfaffenhofen, final assembly and flight testing are performed. Subcomponent and "build-up kits" production are conducted at the other facilities. 3/ Employment at both the Dornier Group and Dornier GmbH increased slightly during 1981-83. In 1983, the number of persons employed at Dornier Group totaled 8,910, up from 8,500 in 1981. Dornier Group employment totaled 9,500 in 1984. 4/ Concerning Dornier GmbH alone, employment totaled 4,666 in 1983, which was virtually unchanged from 1981 and 1982 levels. Dornier GmbH absorbed more than one-half

1/ "CASA Looks Elsewhere as Home Market Lags," Commuter Air, February 1985 207

2/ "Dornier Purchased by Damler-Benz," Commuter/Regional Airline News, June 3, 1985.

3/ Dornier GmbH, Dornier Post, February 1985.

4/ "West German Aerospace: Hungry For Work," Show Daily, June 2, 1985.

of total wages of the Dornier Groups with DM326.6 million (US$124.6 million) in 1983, up from DM307.8 million (US$117.4 million) in 1982. 1/

Dornier Group total sales (composed principally of aircraft and aerospace components) fell significantly over the period. In 1982, sales totaled DM1,573.7 million (US$599.6 million) but fell to DM1,255.4 in 1983 (US$478.9 million), or by 20 percent. Dornier Group sales totaled DM1,500 million in 1984. For Dornier GmbH alone, sales fell by 22 percent, from DM916 million (US$349.1 million) to DM711.0 million (US$271.2 million). Concerning the aircraft sector (civilian and military), sales fell from DM603.8 million (US$230 million) in 1982 to DM456.1 million (US$174 million) in 1983, or by approximately one-third. According to company sources, the sharp decrease in sales was caused mainly by the reduction in sales and services for the Alpha Fighter Jet. Although specific figures are not available, Dornier sources indicate that sales of civil aircraft actually increased substantially over the period. 2/

Aerospace sales of Dornier GmbH were divided between a variety of activities. The 228 project represented the major project for this sector. Other areas of operations included military aerospace manufacturing and maintenance, as well as an array of nonaeronautic activities. By late August 1985, Dornier had orders for 90 228 aircraft and options for an additional 24. 3/ The firm also manufactures components for a few selected international companies, as well as operates a completion center for business aircraft.

Dornier GmbH is able to produce three 228 aircraft per month, mostly for export sales. The company's annual 228 production activities are shown in the following tabulation:

Year	Production
1982	16
1983	27
1984	29
Total	72

The production rate is expected to be increased from three to four aircraft per month in 1986. 4/ The company also will supply 150 aircraft to India in 1985 for license production. However, these are unassembled aircraft in different stages of manufacture. 5/

Investments in fixed tangible assets also fell significantly during 1983, reflecting the sluggish industry outlook. Dornier GmbH capital investments dropped from DM33.9 million (US$12.9 million) in 1982 to DM18 million (US$6.87

1/ Dornier Annual Report, 1983 and Report from U.S. Embassy, Bonn, 1985.
2/ Dornier Annual Report, 1983.
3/ "Dornier 228 Update," Interavia, October 1985.
4/ "West German Aerospace: Hungry For Work," Show Daily, June 2, 1985.
5/ Dornier Annual Report, 1983, and Report from U.S. Embassy, Bonn, 1985.

million) in 1983, or by 47 percent. Data are not currently available for 1984. Dornier GmbH's principal R&D has been directed towards upgrading the 228 in the civil sector and on the postdevelopment of the Alpha fighter jet and the AH-2 aircraft, according to company sources. Exact figures for R&D expenditures are not available.

The most significant international cooperation agreement for Dornier was the 1983 signing of a formal licensing agreement with the Government of India for production of the 228 by the Government-owned Hindustan Aeronautics Ltd. (HAL). The aircraft will be used mainly by Vayudoot, a domestic regional airline. Dornier GmbH will deliver a complete set of aircraft for final assembly by HAL at the Kampor plant. Company sources indicate that a production level of two per month is planned. Dornier is also involved in a number of other international cooperative programs, as shown below.

Company	Product	Country
Airbus Industrie	Inner flaps, flap carriage hour/skin panels, and pressure bulkhead parts.	France, United Kingdom, West Germany, and Spain.
Boeing Military Airplane Co.	Integrating operational avionics in the Boeing E-3A sentry aircraft.	United States.
McDonnell Douglas	Components for Phantom fighter.	Do.
Pilatus	Turbo traineer aircraft	Switzerland.
Dassault-Breguet	Transonic supercritical wing for Alpha Jet.	France.

Government involvement

The West German Government has encouraged the aerospace industry to maintain technological and commercial competitiveness through nationalization. However, Dornier to date has not been involved in this process. The only Government ownership of this firm is a 4-percent share held by the State of Baden-Wuerttemberg. The West German Government does, however, provide research and development aid in the form of "repayable contributions." This assistance cannot exceed 60 percent of the project's cost, as the industry must fund the remainder. During 1962-83, the West German Government provided DM3.7 million in R&D aid for civil aircraft. 1/ Dornier's portion of this assistance is not known. However, the Government did provide a repayable credit of 40 percent of the Dornier 228 research costs. Dornier officials note that the loan has a nominal rate of interest and that a fixed percentage of each 228 sale goes to repayment of this Government aid. 2/

1/ U.S. International Trade Commission, Foreign Industrial Targeting And Its Effects on U.S. Industries--Phase II: The European Community and Its Member States, Report to the Subcommittee on Trade, Committee on Ways and Means . . ., Publication 1517, April 1984.

2/ Data provided by Dornier officials, June 2, 1985.

Regarding export promotion, the West German Government provides some aid to help West German companies participate in trade shows. Industry sources indicate, however, that this assistance is minimal. 1/ Export financing for West German exports is mainly provided by the commercial banking system at market rates. Official export credit insurance and guarantees are provided by Hermes Kreditversh cherungs-AG (Hermes). Dornier officials note that under Hermes insurance arrangement, the Government carries both the political and commercial risk.

Israel

Industry profile

Industry sources indicate that the biggest single driving force behind Israel's aerospace industry is the country's need to maintain an effective national defense in an unstable and hostile region. All of Israel's general aviation aircraft are produced by Israel Aircraft Industries, Ltd (IAI), a 100 percent State-owned company. IAI manufactures a wide range of civil and military aircraft and maintains aircraft for the Israel Air Force and foreign airlines.

Thus, the sole producer of business aircraft in Israel is IAI. The company was established in 1953 as Bedek Aircraft Co., which served as a maintenance base for the country's military aircraft. The change of name to IAI was made in 1967. The firm is currently composed of several divisions, plants, and subsidiary companies. The Aircraft Manufacturing Division produces all of IAI's civil and military aircraft. IAI currently produces the Westwind I and Westwind II business jets. These aircraft are medium-size business planes, generally configured to seat seven passengers.

In 1983, IAI launched the Astra Program, a second-generation, transcontinental business jet. The Astra, known originally as the 1125 Westwind, was designed to supplement and eventually succeed the Westwind business aircraft, produced since 1978. Although the Astra resembles the Westwind business jets, it has been marketed as an entirely separate aircraft, as there have been several changes in the aircraft's design. The most important changes include an enlarged cabin and a new super-critical wing section. Company officials state that the implementation of this technologically advanced wing will give the Astra a much larger range capability, coupled with greater fuel efficiency. IAI sources assert that the aircraft will contain 60 percent U.S. parts and have a seating capacity of four to nine passengers.

IAI's production facilities are located at Ben Gurian International Airport in Lydda. A full computer-aided design and manufacturing system has been in operation since early 1985. A new machine shop has also recently been completed. 2/ Employment at IAI totaled approximately 20,000 in both 1983 and

---

1/ "Governments' Attitudes on Exports Vary," Aviation Week & Space Technology, Sept. 3, 1984, p. 113.

2/ "Israel Aircraft Industries Modernizing Production," Aviation Week & Space Technology, Mar. 25, 1985.

1984, of which 3,500 were production workers. Data regarding the number of workers involved in the manufacture of business aircraft are not available, as military and civil operations are not separated. IAI is reported to employ more people than any other Israeli company. 1/ The current wage rates at IAI range between $21 and $26 per hour. 2/

IAI began production of the first Astra jets during 1984, and final certification and shipment of the aircraft will begin in mid-1986. IAI is able to produce three Astra's per month and has firm orders for 10 in 1985 (all from U.S. companies), totaling $60 million. Sale of Westwind executive jets totaled 15 units in 1984, with 80 percent of these sales in the United States. Company sources indicate that 12 aircraft are expected to be sold in 1985. A total of 200 Westwinds have been sold to date. Future markets for all of IAI's business aircraft, in addition to U.S. companies, are expected to be foreign governments. 3/

In 1984, IAI grossed $900 million, and the company expected to gross $1 billion in 1985. Twenty percent of this ($180 million) was generated by commercial operations, with 80 percent of that portion (16 percent of total earnings) being made from the sale of business aircraft. The remainder was generated by IAI's maintenance and aircraft components operations. Aircraft export sales were an important contributor to company profits, with 85 percent of civil aircraft exports shipped to the United States. 4/ Sales data from previous years are not available.

Government involvement

IAI reportedly spent $100 million in research and development for the Astra Program and an additional $50 million for new production tooling. 5/ According to IAI, it receives no production subsidies or export financing of its sales through the Israeli Government. It is important to note, however, that the firm is 100 percent owned by the Israeli Government. Government ownership has allowed production to continue despite a lack of new orders. In May 1985, there were reportedly 15 Westwind aircraft unsold in storage in Tel Aviv. IAI sources note that this represents less than 1 year of deliveries. 6/ The firm also takes advantage of low-interest development loans and grants from the Government offered to all domestic industries.

Industry sources note that the Astra and other IAI business aircraft have benefited from military work for the Israeli Government. At minimum this allows the firm's total development costs to be spread out over a variety of projects. This assistance is very difficult to quantify. There has been technology transfer, however, regarding the Astra's wings, which are derived from those of IAI's jet fighters. 7/

1/ Report from U.S. Embassy, Tel Aviv, March 1985.

2/ Bron Rek and Dan Boyle, "Aerospace In Israel, Reaching For Self-Sufficiency," Interavia, June 1984.

3/ "Israel May Advance Astra Certification," Aviation Week & Space Technology, Sept. 19, 1983, pp. 63-65.

4/ Report from U.S. Embassy, Tel Aviv, March 1985.

5/ Ibid., 1984.

6/ Marc Grangier, "Unleashing the Astra," Interavia, May 1985.

7/ Gordon Gilbert, "Status Report: IAI Astra," Business and Commercial Aviation, October 1983.

Sweden

Industry profile

Saab-Scania AB, headquartered in Linkoping, Sweden, currently produces civil and military aircraft, as well as automotive products. It is a major producer of guided missiles and space equipment. Currently, the SF-340 aircraft, a 34-seat, twin-engine turboprop, is the only commuter or corporate airliner being produced in Sweden. In 1980, Saab-Scania of Sweden and Fairchild Industries in the United States signed an agreement to jointly develop, produce, and market this aircraft. 1/ Fairchild was responsible for designing the wing, nacelles, empennage, and control surfaces, and Saab-Scania is responsible for the rest of the airframe structure and aerodynamic development. 2/ However, as of November 1, 1985, Fairchild sold its share of the partnership to Saab-Scania and became a subcontractor for the SF 340 program. Production will be gradually transferred to Saab, with Fairchild involvement terminating after production of the 108th aircraft. 3/

Production costs were expected to be 10 to 15 percent higher than if the aircraft were built in only one country. To cut down on production costs, the highly automated production facility at Linkoping, Sweden, employs extensive use of bonding and chemical etching in the airframe. These techniques reduce the number of man-hours required to build the 340. 4/ However, as of November 1985, Saab was in charge of all production, with Fairchild participating only as a subcontractor. 5/

In 1984, 6,115 workers were employed by the aircraft division of Saab-Scania. 6/ According to the following tabulation, employment in Saab's aircraft division has remained relatively steady between 1981 and 1984:

Year	Employees	Wages (million SKr)	Wages (million dollars)
1981	6,413	3,047	602
1982	6,241	3,309	525
1983	6,165	3,535	459
1984	6,115	4,160	501

During this period, employment decreased only 5 percent from 6,413 to 6,115. 7/ Wages and salaries for all Saab-Scania employees increased by 37 percent, from 3,047 SKr (US$602 million) in 1981 to 4,160 SKr (US$501 million) in 1984.

The first order for an SF-340 was secured in 1980. As of May 1985, eight aircraft were in service with six airlines in Europe and the United States.

1/ Saab-Fairchild Annual Report.
2/ "Automation Aids New 340 Production," Aviation Week and Space Technology, May 17, 1982, p. 62.
3/ "Fairchild Eases Out of SF-340 Program," Commuter Air, December 1985, p. 12.
4/ Op. cit., "Automation Aids New 340 Production."
5/ Saab-Scania AB, Saab-Scania Information, Oct. 16, 1985.
6/ Data include military and commercial aircraft.
7/ Report from U.S. Embassy, Linkopeng, February, 1984.

Annual output was expected to reach 35 in 1985, with deliveries to exceed one aircraft every 5 working days. In 1986, output is expected to reach 46 aircraft. A production capacity goal of 72 aircraft per year by 1986 has been set, depending on demand. 1/

Sales of civil aircraft increased from 102 million SKr (US$16.2 million) in 1982 to 404 million SKr (US$48.7 million) in 1984, as shown in the following tabulation (in millions of SKr): 2/

Year	Sales
1982	102
1983	135
1984	404

The following tabulation shows capital expenditures for Saab-Scania's aircraft division from 1981 through 1984: 3/

Year	Capital expenditures (million SKr)	Capital expenditures (million dollars)
1981	221	43.7
1982	271	43.0
1983	168	21.8
1984	184	22.2

Between 1981 and 1984, capital expenditures decreased by 17 percent, from $221 million SKr (US$43.7 million) to 184 million SKr (US$22.2 million). The 1983 capital expenditure of 168 million SKr (US$21.8 million) included construction of a fitting-out hangar for commercial aircraft. 4/

Data regarding research and development expenditures for commuter and business aircraft in Sweden are not currently available. However, it is known that Saab-Scania is studying the technical feasibility of producing a new "stretch" version of the SF340, which would seat 42 to 44 passengers, with moderate changes to the aircraft.

The tabulation below shows the operating income (after depreciation) for Saab-Scania's aircraft division from 1982 to 1984. 5/

1/ Saab-Fairchild News, May 30, 1985, p. 2.
2/ Annual Reports of Saab-Scania, 1981-84.
3/ Data for 1981 include military and civil aircraft missiles, space products, and marine electronics. Separate breakdown for civil aircraft is not available.
4/ Report from U.S. Embassy, Linkopeng, February 1984.
5/ Saab-Scania's Annual Reports, 1981-84.

Year	Operating income (million SKr)	(million dollars)
1982	73	12
1983	157	20
1984	70	9

In 1984, operating profits of Saab-Scania's Aircraft Division after depreciation dropped to 70 million SKr (US$9 million) compared with 157 million SKr (US$20 million) in 1983. The drop in profits was due to production startup costs and increased marketing costs for the 340 commuter airliner. 1/

Other than the joint venture with Fairchild Aircraft Corp. Saab-Scania is involved in only one other collaborative venture. The firm manufactures fuselage parts for the British BAE 146, a 4-engine jet aircraft designed to carry 85 to 110 passengers.

Government involvement

The Swedish Government does not have an official policy to promote the development of civilian aircraft. However, an incentive program has been established that allows industries (including the aerospace sector) to deduct a certain percentage of investments in new production facilities from their taxes. Since Saab-Scania is important in the production of Sweden's military aircraft, the Government supports the expansion of Saab-Scania's civilian aircraft production, as it would strengthen the company's overall position. Production of civilian aircraft is seen as a way to preserve Swedish jobs. Saab-Scania also received a Government loan of approximately $30 million in 1980 to cover the startup costs associated with their joint venture with Fairchild Aircraft Corp. The financing was provided on favorable commercial terms with repayment linked to sales by Saab-Fairchild. 2/

The company also has access to official export credits through the Export Credit Board (EKN) and the Swedish Export Credit Corporation (SEK). The EKN insures companies against export sales risk, and the SEK offers commercial export credit financing and officially supported refinancing. Swedish export terms conform to OECD consensus interest rates. 3/ Saab officials note that to date, no SF 340 purchasers have utilized Swedish Government financing, as more
beneficial terms are available from commercial sources. 4/

Italy

Industry profile

The Italian aerospace industry is involved across the entire spectrum of aerospace activities, from civilian and military aircraft to satellites and

1/ Interavia, April 1985, p. 308.
2/ "Sales Royalties to Help Finance Transport," Aviation Week & Space Technology, Sept. 6, 1982.
3/ Report from U.S. Embassy, Linkopeng, February 1984.
4/ Data provided by Saab Scania officials, June 5, 1985.

spacecraft components. Until recently, the Italian industry was fragmented into a large number of small- and medium-size private and State-owned companies. During 1980-82, the Italian Government forced a reorganization that resulted in partial or total State ownership of most of the industry. The reorganization was undertaken to promote greater concentration, to increase overall industry profitability, and to end unnecessary competition and duplication. 1/

The State-owned portion of the industry was divided into two ownership structures, IRI-Finmeccania and EFIM. IRI-Finmeccania and EFIM are State-owned holding companies that controlled the main airframe manufacturer (Aeritalia), the main engine producer (Fiat Aviazione), and the main helicopter producer (Agusta). EFIM is the smallest of Italy's three State industrial holding companies. To promote even greater centralization, Agusta was transferred in 1982 from EFIM to IRI-Finmeccania, which already controlled Aeritalia and Fiat Aviazione.

During the early 1980's, Italy's aerospace industry passed through a phase of rapid expansion in which it entered numerous international cooperative agreements and joint ventures for the development and production of new aircraft. 2/ By the middle of 1983, sales began to decline for a variety of reasons. The Italian aerospace industry was faced with a worldwide decline in demand for airliners and the high cost of financing resulting from a 25-percent inflation rate within Italy. 3/

Total sales for the Italian aerospace industry, as shown in the following tabulation, increased irregularly from 4.4 billion lira in 1980 (US$1.2 billion) to 3,600 billion lira (US$2.1 billion) in 1983. Data are not currently available for 1984. Export sales are a very important component of total sales and accounted for 65 percent of total sales in 1982 and 64 percent in 1983. 4/

Year	Total sales (billion lira)	Total sales (billion dollars)	Exports (billion lira)	Exports (billion dollars)
1980	1,412	1.2	1,500	1.3
1981	1,900	1.4	1,400	1.0
1982	2,900	1.6	1,900	1.3
1983	3,600	2.1	2,300	1.3

Employment in the Italian aerospace industry also increased irregularly, as shown in the following tabulation, from 40,700 in 1980 to 42,000 in 1983, an increase of 10.1 percent:

1/ "Italy Carves Up Its Aircraft Industry," Interavia, September 1981, p. 854.

2/ "Foreign Investment in South Italy," Italian Trade Topics, 1981, pp. 6-8.

3/ "Italy's Aerospace Industry: Evolution, Not Revolution," Interavia, February 1983, pp. 109-110.

4/ "Italy's Aeronautics Sector Continues Steady Climb," The Journal of Commerce, June 14, 1983, p. 3A.

Year	Total employment
1979	38,500
1980	40,700
1981	42,000
1982	42,600
1983	42,400

Like sales, industry employment began to decline during the second half of 1983. In response to these declines, the Italian Government announced that the industry would face further restructuring to eliminate many of the smaller unprofitabile companies. 1/

The following tabulation shows that investments in Italian aerospace increased irregularly during 1980-83. In December 1984, the Italian Government announced that 100.5 billion lira (US$53 million) would be authorized for 1984 under "Law 46" to promote advances in technology in selected Italian industries. The aeronautical industry was alloted 28.8 billion lira (US$15.2 million). During 1984-89, approximately 690 billion lira (US$363 million) is expected to be invested in the aerospace industry.

Year	Investment (billion lira)	Investment (billion dollars)
1980	163	137
1981	370	265
1982	270	179
1983	255	147

The Aeritalia and Agusta groups dominate the Italian aerospace industry. Aeritalia, under the reorganization, is responsible for all the large fixed-wing airframe, military, and light transport programs. Agusta is responsible for all civilian and military helicopter programs. Despite efforts to extend State control over the entire industry, several private firms such as Aermacchi and SIAI Marchetti continue to thrive, in spite of the amount of state assistance provided to firms in the Aeitalia and Agusta groups. The majority of the smaller airframe producers specialize in the military market or perform subcontract work.

Italy's commuter and business aircraft manufacturers are Aeritalia, Piaggio, and Partenavia. Aeritalia is Italy's largest aerospace manufacture and chief airframe producer. Aeritalia was formed in 1969 as a joint stock company by Fiat and IRI-Finmeccania. The company combined Fiat's aerospace activities with those of Aefer & Salmoirahi of Finmeccania. Aeritalia became

1/ "The Italian Aerospace Industry Faces Up to The Crisis," Interavia, September 1984, p. 984.

operational in 1972, and in 1976, Finmeccania purchased Fiat's share of Aeritalia, giving it complete controle over it's stock capital. The company consists of seven operational groups: combat aircraft; transport aircraft; avionics systems and equipment; space systems and alternative energies, overhaul, modification and maintenance; general aviation; and remotely piloted vehicles and missiles. Aeritalia operates production facilities in Turin, Caselle, and Naples. The company's employment increased from 12,135 in 1981 to 13,300 in 1983.

After years of consistant losses, Aeritalia posted 3 successive years of profits, as shown in the following tabulation:

Year	Profit or (loss) (billion lire)	Profit or (loss) (million dollars)	Sales (billion lira)	Sales (million dollars)
1980----	(5.9)	(5.0)	277	233
1981----	2.4	1.7	550	394
1982----	9.8	6.5	811	537
1983----	5.5	3.2	867	499

Sales at Aeritalia increased annually from 277 billion lira (US$233 million) in 1980 to 867 billion lira (US$499 million) in 1983. Aeritalia's profits rose to 9.8 million lira (US$6.5 million) in 1982 from a loss of 5.9 million lira (US$5.0 million) in 1980. Profits totaled 5.5 million lira (US$3.2 million) in 1983. Data for 1984 are not available.

Aeritalia is presently involved in a 50-50 joint venture with Aerospatiale of France to produce the ATR 42 regional transport. The plane, a high-wing, twin turboprop aircraft, is designed to seat between 40 and 60 passengers. The ATR 42 is the largest civil aircraft venture in the history of Italian aviation. The French and Italian Governments shared the $100 million development costs. The joint venture agreement requires Aeritalia to furnish the entire fuselage, including the tail unit and landing gear, the hydraulics, air-conditioning, and pressurization system. Aerospatiale will supply the wings, the flight deck and cabin, the power plant, electrical system and flight controls. Aeritalia will also assemble and test all military and cargo versions of the ATR 42, and Aerospatiale will assemble and test the civil passenger models. The ATR 42 was first delivered in October 1985. 1/

Piaggio Aeronautiche e Meccanich (Piaggio), located in Genoa, is another airframe manufacturer in Italy. Piaggio currently employs approximately 1,500 workers to produce aircraft of its own design and to produce components for Aeritalia and other major foreign aircraft manufacturers; it employed 1,300 such workers in 1982. The firm was founded in 1964 and presently produces only the P166 for the civilian market. The P166 is a turboprop light transport designed to serve a variety of missions including executive transport. Over 200 P166's are presently in operation around the world.

1/ "Italian Aerospace Moves Forward," Aviation Week & Space Technology, May 27, 1985, pp. 62-84.

The firm was also involved in a joint venture with an American firm to develop and produce a business aircraft. The GP-180 Avanti, a twin-turboprop pusher, tandem-wing business aircraft, is designed to seat between 7 to 9 passengers. The joint venture agreement required Piaggio to furnish the wings, the empennages, and the rear unpressurized section of the fuselage. Gates was responsible for supplying the entire forward part (cockpit and passenger cabin) of the aircraft. 1/ However, in January 1986 Gates Learjet withdrew its support of the Avanti program, but offered to act as a subcontractor for Piaggio. 2/ Industry sources indicate that no decision has yet been made by Piaggio regarding subcontractors or new partners for the aircraft. Data regarding sales, profitability, research and development, and capital expenditures for Piaggio are not available.

Partenavia Construgioni Aeronautiche SPA (Partenavia) was founded in 1957 as a general aviation manufacturer. Partenavia became a subsidiary of Aeritalia in 1981. Located in Naples-Casoria, the firm currently employs approximately 150 workers to produce two light aircraft models, the P66 and the P68. The P66 (Charlie), used as a basic trainer, is a light monoplane powered by U.S.-built engines, capable of seating between 2 to 4 passengers. The P68 is a twin turboprop high-wing light multi-purpose transport. The plane is capable of seating between 6 to 7 passengers and three versions are presently being produced. Over 270 P68's have been delivered to customers in over 20 countries. 3/ However, according to industry sources, the P66 is not currently used for commuter or business purposes. The P68 has recently been re-engined and is called the Spartacus. This airplane is being marketed in the United States as an owner-operated business aircraft.

Partenavia reportedly receives little financial backing from its state-owned parent Aeritalia. The firm recorded sales for all aerospace of 5.7 billion lira (US$5 million) in 1981 and 1.7 billion lira ($US1.2 million) in 1982. Deliveries of aircraft totaled 38 in 1982, with more than 20 to the United States. Partenavia profits were 8 million lira ($US7,042) in 1981 and 45 million lira (US$33,284) in 1982. 4/ Data for other years are not available.

Italian aerospace companies are participating in a number of international cooperative programs. Risk sharing and licensed-production are favorite Italian ways of keeping down costs. 5/ The following is a listing of the programs in which Aeitalia and Piaggio were involved in during 1980-85. According to industry sources, Partenavia is not currently involved in any joint ventures.

1/ "Learjet and Piaggio Work Together," Flight International, Oct. 22, 1985, p. 100B.

2/ "Gates Learjet Withdraws Its Support of Italian GP-180 Avanti Program," Aviation Week & Space Technology, Jan. 20, 1986, p. 25.

3/ "Partenavia-Survial Off the Beaten Path," Interavia, August 1983, pp. 866-867.

4/ Ibid.

5/ Ian Parker, "Italian Aerospace Industry," Flight International, June 23, 1983.

Company	Foreign company and country	Product
Aeritalia	Embraer (Brazil)----------	AM-X Strike fighter.
---do----	Aerospatiale (France)-------	ATR-42 commuter aircraft.
---do----	Boeing Commercial Airplane Co. (United States).	Components for the Boeing. 727, 747, 767.
---do----	European Space Agency-------	Space vehicle parts.
---do----	Lockheed (United States)----	F-104 higher plane.
---do----	McDonnell Douglas (United States).	MD-80 components.
---do----	British Aerospace (United Kingdom).	Panavia tornado fighter plane.
---do----	Airbus Industrie----------	A310 Airbus components.
Piaggio	Gates Learjet (United States).	GP-180 (Avanti).

Government involvement

Aerospace is an important industrial sector for Italy. This has been evident through the Government's orchestration of industry mergers. Industry sources note that the Government has also taken an important role in the ATR 42, beginning with opening negotiations with the French on coproduction. 1/ Government assistance exceeding $50 million has already been provided. Industry officials indicate that the Italian Government's investment may have, in fact, exceeded $100 million by the end of 1985. Data regarding assistance by the central government for Piaggio and Partenavia are not available. 2/

As stated earlier, the largest Italian aerospace producer, Aeritalia, is 100 percent government-owned. Partenavia is a wholly-owned subsidiary of Aeritalia. Thus two of the three major commuter or business aircraft producers have a high level of government involvement. Industry sources note that state support does exist through various programs. 3/

The most prominent government assistance comes from Public Law 46 discussed earlier. The purpose of this legislation is to promote technological advances. In late 1984, 28.8 billion lira (US$15.2 million) was allocated to the Italian aerospace sector. 4/ Recently, a law was approved to provide financial support to the aerospace sector for firms involved in international cooperation programs related to the production of aircraft and engines. The assistance takes three forms: loans for research and development, interest reductions for production start-up costs, and financial aid for joint projects. Industry sources note that this aid would be in addition to that given under Public Law 46. Figures for the amount of assistance under this legislation are not available.

1/ Marc Granger and Mark Lambert, "The Italian Aerospace Industry - A Firm Future At Last" Interavia, February 1982.

2/ Ibid.

3/ "The Italian Aerospace Industry Faces Up To The Crisis," Interavia, September 1984.

4/ Report from U.S. Embassy, Rome, December 1984.

Indonesia

Industry profile

The Indonesian aviation industry is reported to be one of Asia's largest and most modern, second only to Japan. Under the sponsorship of the Indonesian Airforce, the first Indonesian designed plane was manufactured in 1954 as a counter insurgency aircraft. Three additional experimental models and several helicopter prototypes followed. In 1961, the Lembaza Persiapan Industri Penerbangon (LAPID) was created by decree as part of an overall Governmental program to modernize specific important Indonesian industries. The LAPID increased funding for research and development and under a licensing agreement with the Polish Government manufactured an all-metal, single-engine plane (P2L-104 Gelatich) capable of seating four persons.

The Advanced and Aviation Technology Division of Pertamina, and the Indonesian State Oil Co., signed a series of international cooperative agreements in 1975 with Construciones Aeronauticas SA (CASA) of Spain and Messerschmitt Bolkow Blohm (MBB) of West Germany to produce aircraft under license from imported knockdown component kits. In an effort to centralize existing aircraft manufacturing facilities, LAPID merged with Pertamina in 1976, forming P.T. Nurtanio Aircraft Industries, Ltd. 1/

P.T. Nurtanio is owned by the Indonesian Government and is part of a Government plan to increase Indonesia's overall technological base and to expand its level of industralization enabling the country to compete effectively with Japan, Europe, and the United States. 2/ Nurtanio began assembling CASA's C-212 Aviacar light passenger/commuter transport (called the NC 212) and MBB's BO-105 helicopter in 1976. P.T. Nurtanio currently operates two modern production facilities in Bandung, West Java. These facilities, encompassing 380,000 square meters, are equipped with the most modern machinery available, including high-tech U.S.-built machine tools. 3/ Nurtanio is made up of six divisions: rotary wing, fixed wing, flight operations, aircraft servicing, weapons systems, and universal maintenance center.

The NC-212 is a high-wing, twin turboprop, short takeoff and landing aircraft powered by 2 turbine engines, designed to seat between 26 and 28 passengers. The plane performs both civilian (commuter) and military duties. The percentage of local contents grew from 12 to 14 percent in 1977 to greater than 85 percent by 1983. Presently, local content and production man-hours account for approximately 70 percent of the value of the aircraft.

Employment at Nurtanio, as shown in the following tabulation, has grown from approximately 600 workers in 1976 to over 12,000 workers by 1984. Employment declined in 1985 to slightly over 11,000. 4/ Nurtanio officials expect employment by the year 2000 to range between 50,000 and 60,000

1/ James Holahan, "From the Sikumbang to the CN 235," Aviation Convention News, Mar. 1, 1985.

2/ "Indonesia Unveils Plans for Technological Growth," The Journal of Commerce, Nov. 29, 1984, p. 3A.

3/ Mark Lambert, "Nurtanio-The Industry with a Future," Interavia, October 1984.

4/ Op. cit., "From the Sikumbang to the CN235."

workers. All but a small fraction of the workers employed by Nurtanio work on the NC-212 or one of the company's three other international cooperative programs. The majority of Nurtanio's employees are in their early 20's and have secondary school education supplemented by on-the-job training. Wages paid to production workers ranged between 80,000 to 90,000 rupiahs per month (US$80-US$90) during 1984. Engineers' salaries range from $200 to $500 per month. 1/

Year	Employment
1980	1/
1981	1/
1982	5,200
1983	7,200
1984	12,000

1/ Not available.

Since 1976, P.T. Nurtanio has delivered 657 NC-212's, producing an average of 18 per year. Nurtanio's Bandung production facility has a production capacity of 4 planes per month. The company expects to increase shipments to 24 planes per year by 1986, with the breakeven point for the NC-212 estimated at 110 aircraft. The company expects to build another 120 NC-212's before it terminates the production line. Nurtanio has been able to export NC-212's to Thailand (4) and GUAM (1).

The major proportion of Nurtanio's research and development efforts have been directed towards the development of the CN-235. The joint venture between CASA and Nurtanio required each company to contribute $40 million as an initial investment. Nurtanio and CASA entered into a 50-50 joint venture in 1979 forming Aircraft Technology Industries (Airtech). The joint venture was formed to produce a large, multipurpose, twin-engine transport capable of military and civilian duties. The result was the CN-235 fixed-wing STOL aircraft powered by two turboprop engines. The CN-235 was designed as a regional airliner capable of seating between 34 and 39 passengers. Under the agreement, CASA is responsible for supplying the center wing box, center and forward fuselage sections, cockpit, and the undercarriage. Nurtanio will supply the outer wing section, rear fuselage, and the stabilizers. Prototypes have been built in Spain and Indonesia. Nurtanio expects the CN-235 to be in full production by 1987 with a production capacity of 7 units per year. The firm is also working on development of a stretched version of the CN235 to seat 60 passengers. Company officials indicate that this aircraft, the CN260, could be produced by the late 1980's.

Although specific figures are not available, industry sources note that Nurtanio reported annual tax losses during 1980-82. In 1983, profits totaled 5.98 billion rupiah (US$5.62 million), and 6 billion rupiah (US$5.98 million) in 1984. 2/

1/ Ibid.

2/ "Indonesia Aims CN-235 At Export Mart," The Journal of Commerce, Dec. 19, 1984, p. 2A.