GAO

United States General Accounting Office

Report to the Chairman, Subcommittee on Aviation, Committee on Public Works and Transportation, House of Representatives

August 1992

AIRCRAFT CERTIFICATION

Limited Progress on Developing International Design Standards

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Resources, Community, and
Economic Development Division

B-248341

August 20, 1992

The Honorable James L. Oberstar
Chairman, Subcommittee on Aviation
Committee on Public Works
and Transportation
House of Representatives

Dear Mr. Chairman:

This report, prepared at your request, provides information on the Federal Aviation Administration's (FAA) certification of commercial aircraft and the coordination of certification activities between FAA and foreign authorities. We are making recommendations aimed at improving the effectiveness of FAA's international certification activities.

As arranged with your office, unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days after the date of the letter. We will then send copies to the Secretary of Transportation; the Administrator, FAA; the Director, Office of Management and Budget; and other interested parties. We will also send copies to others upon request.

This work was performed under the direction of Kenneth M. Mead, Director, Transportation Issues, who can be reached at (202) 275-1000. Other major contributors are listed in appendix V.

Sincerely yours,

J. Dexter Peach
Assistant Comptroller General

Executive Summary

Purpose

Over the last decade, the production and sale of commercial transport airplanes has become increasingly international. Thirty percent of the components for the Boeing 767 aircraft, for example, originate outside the United States. The Federal Aviation Administration's (FAA) certification of aircraft and coordination with foreign authorities are critical to the safe and efficient production of aircraft. Citing the increasingly international nature of aircraft manufacturing, the Chairman, Subcommittee on Aviation, House Committee on Public Works and Transportation, asked GAO to determine the (1) benefits of common international certification standards and practices, (2) effectiveness of efforts to produce such commonality, and (3) differences in the relationship between certification authorities and aircraft manufacturers in the United States and Europe.

Background

The Federal Aviation Act requires that commercial aircraft registered in the United States have their designs certified as safe. Because most commercial transport airplanes are produced in the United States and Europe, FAA must also interact with European authorities. European regulators coordinate certification activities through one organization—the Joint Aviation Authorities (JAA)—that has developed its own standards and practices since 1970.

Most transport airplanes produced in Europe and the United States are exported. Europe's largest manufacturer—Airbus Industrie—estimates that 80 percent of the aircraft it has produced or has orders for are exports. The two U.S. manufacturers—Boeing Company and Douglas Aircraft Company—exported 77 percent of their aircraft in 1991. Recognizing this, FAA and JAA initiated an effort in 1983 to eliminate the differences between and duplication of their certification standards and practices.

Results in Brief

Without exception, domestic and foreign manufacturers and regulators stated that safety is their top priority and that common international standards and practices would enhance safety. They also acknowledged that the certification system is not efficient because differences in FAA's and JAA's interpretation of some certification regulations and duplication of activities result in substantial additional costs for manufacturers and inefficient use of regulatory resources. FAA and JAA initiated a joint effort in 1983 to produce commonality, but they have made little progress in eliminating the differences and duplication, in part because JAA did not have a consolidated standard until 1988. Problems also persist because

eliminating them requires compromise and intrudes on each certification authority's independence.

After 9 years of little progress, FAA and JAA recently began to develop a strategy to eliminate differences and are exploring the feasibility of developing such mechanisms as joint certification teams to identify and resolve interpretational differences early. In June 1992 FAA and JAA issued a strategic plan in which they established specific time frames for eliminating regulatory differences. Although the plan is a good starting point for the eventual resolution of certification differences, GAO believes that FAA must periodically monitor the progress made relative to the time frames established in the plan.

The relationship between certifying authorities and aircraft manufacturers differs significantly in the United States and Europe. Several European authorities charge the manufacturer for their certification activities conducted through JAA; FAA does not charge. FAA uses designated representatives employed by the manufacturers to conduct much of its certification activity; European authorities do not. Finally, JAA's rulemaking process is more expeditious than FAA's process primarily because discussions and collaboration with manufacturers occur at the beginning of the process. In February 1991 FAA created the Aviation Rulemaking Advisory Committee to improve its process by obtaining industry input earlier. GAO and FAA agree that it is too early to determine whether the committee has met these objectives.

Principal Findings

Inefficient Certification System

The current system of certifying designs for commercial transport airplanes lacks uniform standards, interpretations, and procedures, resulting in an increase in manufacturers' costs and inefficient use of resources. Regulatory differences have often arisen late in the certification process and have resulted in costly design changes. For example, JAA interpreted an identical regulation differently from FAA, stating that Douglas had not minimized the risk of possible damage after an engine explosion. Douglas officials stated that JAA's certification of the MD-11 had several such differences and cost the company $21 million. According to Boeing officials, late interpretational differences unnecessarily increased

total production costs between $60 million and $90 million for Boeing's 747-400 fleet.

FAA and JAA also duplicate certification activities. For example, Airbus officials stated, and FAA's Aircraft Certification Service Director acknowledged, that FAA unnecessarily duplicated many of JAA's tests and analyses for the A320 aircraft. Also, Boeing spent approximately $500,000 to conduct an 11-hour flight test of the 747-400 aircraft for JAA even though FAA had conducted similar tests and certified the aircraft.

Common standards and practices would not only eliminate these unnecessary costs but might increase overall aviation safety as well. According to FAA officials, resources saved through increased coordination would be significant and could be used to address other safety issues. Commonality would also lead to a greater exchange of information concerning the need for new or improved standards.

FAA and JAA Efforts to Resolve Differences and Duplication

Despite initiating a joint effort in 1983 and formally placing a high priority on harmonizing certification standards and practices in 1989, FAA and JAA have achieved little progress. An FAA analysis in the early 1980s found 267 significant differences between the two standards. GAO found that at least 233, or 87 percent, of those differences still exist. FAA's Associate Administrator for Regulation and Certification has also stated that no real progress has been achieved to eliminate unnecessary duplication on specific projects over the last 9 years.

Differences and duplication persist because they are rooted in individual statutory obligations and their elimination requires compromising and relinquishing some independence. Also, until recently FAA and JAA had not developed an effective strategy to focus their efforts. Instead, they implemented an ad hoc approach in which numerous working groups were created as differences arose. Recognizing that a new approach was needed, FAA and JAA officials began developing a strategic plan in late February 1992 and issued the plan in June 1992.

Common standards alone will not eliminate interpretational differences between FAA and JAA. Domestic and foreign manufacturers as well as FAA have made several proposals to create a mechanism to identify and resolve interpretational differences, including the establishment of joint certification teams. FAA and JAA officials recently began discussing the feasibility of using the team approach on future certification projects.

Differences in FAA and Other Authorities' Relationship to Manufacturers

FAA and European certification authorities differ in their relationship to manufacturers in at least three areas. First, several European authorities charge aircraft manufacturers for activities conducted through JAA, while FAA does not have such user fees. Second, FAA's 288-member transport certification staff relies upon designated representatives employed by domestic manufacturers—447 at Boeing and 243 at Douglas—to conduct certification analyses and tests. JAA does not employ such a designee system. Finally, JAA collaborates from the beginning with manufacturers and implements regulations much faster than FAA. FAA created a 2-year Aviation Rulemaking Advisory Committee to help improve its process. When its term expires in February 1993, FAA expects to recharter the committee with the Congress.

Recommendations

To help ensure that the recent momentum in the harmonization process results in the resolution of regulatory differences and avoidance of duplication between FAA and JAA, GAO recommends that the Secretary of Transportation direct the Administrator, FAA, to (1) monitor and report annually to the Secretary on the progress achieved relative to time frames established in the strategic plan, (2) develop mechanisms, such as joint certification teams, with JAA to coordinate certification activities and help prevent late design changes and duplication, and (3) report the achievements, problems, and impacts of the advisory committee to the Congress, when rechartering the committee.

Agency Comments

The Department of Transportation (DOT) generally agreed with GAO's recommendations. In a draft of this report, GAO recommended that FAA use the strategic plan that was under development to set priorities and establish time frames for the harmonization effort. DOT stated that the plan issued in June 1992 accomplishes this. GAO concurs but believes that FAA must monitor actual progress against the plan and make programmatic changes as needed to ensure that the plan results in the resolution of regulatory differences.

DOT stated that it would report to the Congress the information concerning the Aviation Rulemaking Advisory Committee if the Congress expresses its need for such information. GAO believes that DOT should not wait for the Congress to ask for this information but should take the initiative to keep the Congress informed in this important area. DOT's comments and GAO's responses are included as appendix IV.

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Abbreviations

AIA	Aerospace Industries Association of America
ARAC	Aviation Rulemaking Advisory Committee
BAA	Bilateral Airworthiness Agreement
DER	designated engineering representative
DOT	Department of Transportation
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
GAO	General Accounting Office
JAA	Joint Aviation Authorities
JAR	Joint Aviation Requirements

Introduction

The Federal Aviation Administration (FAA) is responsible for certifying as safe all aircraft produced in the United States or imported by U.S. companies and individuals. In carrying out this mandate, FAA has developed detailed regulations governing the certification of commercial transport airplane designs.[1] Recognizing the international nature of aircraft manufacturing and the economic importance of such manufacturing to the United States, FAA also has numerous agreements with foreign aviation authorities to facilitate the reciprocal acceptance of certification activities and test results. With the development of Airbus Industrie, European authorities in the 1970s saw the need to develop a common code and integrated certification system. Although based on FAA's regulations, the European code contains significant differences from FAA's code. Differences also exist between FAA and European regulatory interpretations and certification practices. Recognizing the problems such differences could cause aircraft manufacturers, FAA and the European authorities initiated a joint effort in 1983 to "harmonize" (resolve) these differences.

FAA's Approach to Aircraft Certification

The Federal Aviation Act of 1958 requires that any civil aircraft registered in the United States be certified as safe by FAA before it can be operated. To fulfill this mandate, FAA certifies all aircraft produced in the United States or imported by U.S. companies and individuals. FAA certifies the airworthiness of commercial aircraft by approving particular designs and production quality control methods as in compliance with its regulations and by ensuring that each aircraft conforms to a certified design and production process. FAA's certification of airplane designs usually occurs over the typical 5-year aircraft development process and involves extensive analysis and flight testing. FAA certifies aircraft designs, production processes, and the airworthiness of individual aircraft through four directorates: the Transport Airplane Directorate in Seattle, Washington; Small Airplane Directorate in Kansas City, Missouri; Engine and Propeller Directorate in Burlington, Massachusetts; and Rotorcraft Directorate in Fort Worth, Texas. All directorates report to the Director, Aircraft Certification Service, in Washington, D.C.

FAA also recognizes the certification systems of 27 other nations through formal Bilateral Airworthiness Agreements (see app. I). FAA and foreign

[1]FAA regulations governing the certification of transport airplane designs—the focus of this report—are contained in title 14, part 25, of the Code of Federal Regulations, also known as FAR (Federal Aviation Regulations) 25. Generally, transport category airplanes are those weighing over 12,500 pounds and having 10 or more seats. However, some propeller-driven airplanes with 10 to 19 seats and weighing between 12,500 and 19,000 pounds are classified as commuter category airplanes.

authorities developed these agreements to facilitate the import and export of certified aircraft through the reciprocal acceptance of certification test results and analyses to the maximum extent practical. Specifically, these agreements were developed in an attempt to (1) prevent aircraft manufacturers from incurring a substantial, unnecessary burden of repetitive certification testing and analysis for each importing country without recognition of the efforts already completed for domestic certification and (2) facilitate liaison between FAA and foreign aviation authorities to ensure that the safety standards of the importing country are satisfied through the maximum use of the exporting country's certification system. These agreements state, however, that if differences in certification requirements or interpretations arise, the importing country has the right to impose its position.

European Integration of Certification Systems

In the early 1970s a number of civil aviation authorities recognized a need to unify the numerous national certification codes used in Europe and agreed to develop common regulations for the design of transport airplanes. As the Europeans actively moved toward the launch of two major cooperative programs—the Concorde project and the Airbus consortium—the manufacturing industry pushed aggressively for a common code governing transport airplane designs, citing the economic advantages of increased commonality. The authorities agreed and created the Joint Aviation Authorities (JAA) in 1970 to develop such a code.[2]

JAA used FAR 25 as the basis for its new common code—the Joint Aviation Requirements Part 25 (JAR 25). However, the European authorities encountered difficulties coming to a unanimous agreement on a single text that would encompass all possible national conditions. As a result, the authorities decided that each would retain the right to introduce country-specific requirements—called "national variants"—into JAA's regulations. The first complete edition of JAR 25 was issued in 1976 with over 80 national variants. The launch of the Airbus A320 project in 1984 and the decision by Airbus Industrie to conduct the certification jointly with the four authorities that had adopted JAR 25 as their national code quickly showed the need for eliminating national variants. As a result, JAA and the European manufacturing industry undertook a substantial effort to eliminate the differences. This effort led to the elimination of all national variants by 1988. Since 1988, however, several variants have reappeared in

[2]As of March 1992, JAA had 19 member countries—Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom, and Yugoslavia.

various countries' operational and maintenance requirements. JAA is currently attempting to eliminate these variants.

The development of JAR 25 and pressure from the European Community to ensure common standards and practices encouraged the airworthiness authorities to move toward common certification procedures. In 1987 the then 11-member authorities of JAA formally agreed to develop joint certification teams to conduct one certification per aircraft design. Since JAA is not a statutory authority, each authority retained the right to issue the actual certificate. JAA became the coordinating body through which certification projects were conducted. This agreement extended JAA's work from the development of common requirements to the actual joint application of requirements. Since 1987 joint JAA teams have conducted or are in the process of conducting 15 transport airplane certification projects. These projects include Boeing Company's 747-400 (1989) and 777 (in process) and Douglas Aircraft Company's MD-11 (1991).

In November 1991 the European Community passed the Regulation on the Harmonization of Technical Requirements and Procedures. This regulation requires that as of January 1, 1992, all European Community countries (1) join JAA, (2) adopt all existing Joint Aviation Requirements,[3] and (3) accept imported products certified by JAA without additional technical conditions.

The International Nature of Aircraft Production

Over the last decade, the production and sale of transport airplanes has become an increasingly international enterprise. Although only five companies in the world produce aircraft with 100 seats or more, these companies depend on a vast, international network of suppliers.[4] For example, 30 percent of the components for the Boeing 767 aircraft originate outside the United States. Twenty percent of the components in the new Boeing 777 are being produced by Japanese firms. A Chinese firm produces the nose and tail sections for Douglas MD-80 aircraft. Airbus Industrie uses over 500 U.S. companies in 34 states to supply its aircraft production system.

In addition, the five companies have increasingly depended on exporting their products to remain competitive. In the United States, for example,

[3]JAA has also issued regulations governing approved aircraft maintenance organizations, as well as the design and manufacture of smaller aircraft, aircraft engines, and propellers.

[4]Airbus is headquartered in Toulouse, France; Boeing in Seattle, Washington; British Aerospace in Hatfield, England; Douglas in Long Beach, California; and Fokker Aircraft B.V. in Amsterdam, the Netherlands.

exports of transport aircraft have grown by 227 percent between 1987 and 1991—from $6.4 billion to $20.9 billion. In 1991 the United States imported over $1 billion in transport aircraft. As a result, civil aircraft exports exceeded imports in the United States in 1991 by over $19 billion dollars, making aircraft exports the largest positive influence on the U.S. balance of trade. Table 1.1 shows the total value of exports since 1983.

Table 1.1: Value of Domestic Transport Aircraft Production Compared With Value of Exports, 1983-91

Dollars in billions

Year	Value of aircraft produced	Value of aircraft exported	Percent
1983	$ 8.0	$ 4.7	58.8
1984	5.7	3.2	56.1
1985	8.4	5.5	65.5
1986	10.3	6.3	61.2
1987	10.5	6.4	61.0
1988	13.7	8.8	64.2
1989	15.1	12.3	81.5
1990	22.2	16.7	75.2
1991	26.9	20.9	77.7

Source: Aerospace Industries Association of America, Inc.

The three European transport aircraft manufacturers also depend heavily on exports. For example, Airbus estimates that of the 1,767 transport aircraft it had produced or had orders for by the end of 1991, 1,419 (80 percent) were for export. Nearly one-half of the total orders for the Fokker-100 aircraft as of December 1991 were from U.S. airlines. British Aerospace exported 45, or 83 percent, of the 54 BAe-146 aircraft it produced in 1990 and 1991.

FAA Harmonization Effort With JAA

Recognizing that aircraft manufacturers could not effectively produce and market their products on an international basis unless certification standards were reasonably similar, FAA and JAA initiated an effort in 1983 to "harmonize" differences in their standards, interpretations, and practices. Since that time, FAA and JAA have held nine annual conferences and established numerous working groups to eliminate the differences between their two codes, regulatory interpretations, and certification procedures. At the sixth annual conference in 1989, FAA and JAA identified this effort as a high-priority objective for both agencies.

As the international nature of aircraft manufacture increased during the 1980s, the number of countries with certification responsibility expanded. FAA responded to this trend by placing increasing emphasis on international cooperation. In 1990 FAA invited certification authorities from Canada, Australia, China, and the then Soviet Union to attend the FAA/JAA conference. In 1991 FAA formally established the international standardization of aviation standards, practices, and procedures governing the design and manufacture of aircraft as a strategic objective for the agency. Stating that differences between FAA requirements and those of other countries impose a heavy burden on U.S. aircraft manufacturers and operators, the Department of Transportation (DOT) in an April 1992 report to the President highlighted the harmonization effort as one of the highest-priority items for departmental action.[5]

In May 1991 the Administrative Conference of the United States issued a report on the FAA/JAA harmonization effort and FAA's compliance with the procedural requirements of U.S administrative law.[6] The report concluded that the harmonization effort was (1) a useful development that should be encouraged and (2) in full compliance with U.S. administrative requirements. The report did not, however, address the effectiveness of the effort to reduce the differences in certification standards, interpretations, or practices. Instead, it focused on FAA's experience in establishing the joint effort and the applicability of such international cooperation to other U.S. regulatory agencies.

Objectives, Scope, and Methodology

At the request of the Chairman, Subcommittee on Aviation, House Committee on Public Works and Transportation, we reviewed FAA's coordination of aircraft certification activities with European authorities. Specifically, we determined the (1) benefits of common international certification standards and processes, (2) progress to date in developing common international standards and practices, and (3) differences in the relationship between certification authorities and aircraft manufacturers in the United States and Europe.

To determine the efficiency of the current certification system and the potential benefits of common international certification standards and practices, we evaluated data from FAA and domestic manufacturers on recent aircraft certification projects and interviewed officials from FAA

[5]Report to the President: Review of Regulations, Department of Transportation, April 1992.

[6]George A. Bermann, Regulatory Cooperation with Counterpart Agencies Abroad: The FAA's Aircraft Certification Experience, Prepared for the Administrative Conference of the United States, May 1991.

headquarters and the Transport Airplane Directorate about those projects. We also reviewed relevant legislation, regulations, bilateral agreements, and internal policies governing FAA's certification of commercial aircraft. In addition, we interviewed and obtained data from officials representing JAA in Hoofddorp, the Netherlands; the British Civil Aviation Authority in Gatwick, England; the French Directorate General for Civil Aviation in Paris, France; the Netherlands Department of Civil Aviation in Hoofddorp, the Netherlands; European Community Transport Commission in Brussels, Belgium; European Civil Aviation Conference in Paris, France; Boeing; Douglas; Airbus; British Aerospace; and Fokker to obtain their views on the need for and benefits of international standards, practices, and procedures.

We interviewed and obtained data from FAA and JAA officials as well as from representatives of the five manufacturers and two trade associations—Aerospace Industries Association of America (AIA) in Washington, D.C., and the Association of European Aerospace Manufacturers in Paris, France—to determine the progress to date in developing common international standards and practices. We also reviewed the May 1991 report prepared for the Administrative Conference of the United States and interviewed the report's author.

To identify and evaluate the differences between FAA's relationship with domestic manufacturers and foreign authorities' relationship with their manufacturers, we compared FAA and European certification policies and practices. We obtained the views of officials from all five producers of transport category airplanes, as well as from FAA, JAA, and the civil aviation authorities of the United Kingdom, France, and the Netherlands. In addition, we reviewed several recent studies on international aircraft manufacturing prepared by the Office of Technology Assessment, Congressional Research Service, and European Community.[7]

As agreed, we limited the scope of our review to FAA's certification of designs for transport category airplanes. We did not review FAA's certification program for smaller aircraft, engines, or rotorcraft. We also did not review FAA's harmonization effort with JAA for requirements governing airplane production, airworthiness certification, and continuing airworthiness. This report is the first in a series on FAA's aircraft certification program. These other areas may be discussed in later reports.

[7]Competing Economies: America, Europe, and the Pacific Rim, Office of Technology Assessment, October 1991; Airbus Industrie: An Economic and Trade Perspective, Congressional Research Service, February 1992; and U.S. Government Support of the U.S. Commercial Aircraft Industry, Commission of the European Communities, November 1991.

We obtained written comments from DOT on a draft of this report and incorporated its comments where appropriate. In addition, the full text of DOT's comments and our response appear in appendix IV. We also provided European aviation officials and foreign and domestic manufacturing representatives with appropriate sections of a draft of this report and incorporated their changes where appropriate. As requested, we have included some correspondence between FAA, JAA, and aircraft manufacturers concerning the harmonization effort as an appendix to our report (see app. III). We conducted our work between November 1991 and May 1992 in accordance with generally accepted government auditing standards.

Uniform International Aircraft Certification Standards and Practices Needed

The current certification system for commercial transport airplanes is not efficient. Despite the increasingly international nature of aircraft production and sales, FAA and JAA differ in their interpretations of regulations, impose additional requirements, and duplicate certification activities. These differences and duplication result in substantial costs to aircraft manufacturers and an inefficient use of regulatory resources. Regulatory differences have often arisen between FAA and JAA late in the certification process and have resulted in costly design changes. Common international standards, interpretations, and procedures for certifying airplane designs would eliminate many of these unnecessary costs and could increase safety through more effective coordination and efficient allocation of regulatory resources. The differences and duplication persist, however, because their elimination requires compromise and coordination that intrude on each authority's independent obligation under its national law to establish its own design requirements and certification practices.

Current Certification System Is Not Efficient

Without exception, domestic and foreign manufacturers and regulators stated that safety is their top priority and that common international standards and practices would enhance safety. They also acknowledged that the current certification system is not efficient because differences in FAA's and JAA's interpretations of regulations and duplication of activities result in substantial costs for manufacturers and inefficient use of regulatory resources that could be used to address other safety issues.

FAA and JAA Interpret Regulations Differently and Impose Additional Requirements

The certification system is burdensome on aircraft manufacturers because the two preeminent authorities—FAA and JAA—often interpret regulations differently and impose additional requirements. If imposed late in the typical 5-year design certification process, these differences can result in design changes that cost the manufacturer millions of dollars. Officials from all five manufacturers cited late differences in interpreting identical regulations as a very serious and costly problem when FAA and JAA certify aircraft. These manufacturers provided numerous examples of such late differences. FAA and JAA officials acknowledged that differences of interpretation do arise during the certification process and if discovered too late result in costly design changes.

Since 1989, for example, three major certification projects—the Boeing 747-400, Airbus A340, and Douglas MD-11—have experienced late design changes that have arisen from differing interpretations or additional requirements and have significantly increased production costs. In each

case, additional costs were incurred by the manufacturer even though one authority had already indicated that the original design was safe.

Differences in FAA's and JAA's interpretations resulted in design changes for the 747-400 aircraft that increased Boeing's total production costs by between $60 and $90 million for the fleet. FAA regulations state that for derivative aircraft, new design requirements cannot be imposed unless the area affected by the new requirements was changed significantly or service experience was unsatisfactory. Because the 747-400 was a derivative of the 747-300 and had an identical floor in the upper deck, FAA did not require the 747-400 to meet a new rule that required the upper deck floor to be designed to withstand the effects of depressurization resulting from a 20-square-foot opening in the fuselage. JAA differed with FAA and required that the 747-400 meet the new regulation even though FAA had already certified the aircraft. Boeing agreed to redesign the aircraft and retrofit those that it had already exported to Europe.

FAA and JAA also differed in their interpretation of the regulation governing the segregation of electrical wiring for Boeing's 747-400 aircraft. Although FAA's and JAA's regulations are identically worded, JAA applied a more conservative interpretation of the word "segregation." Because this difference surfaced late in the certification process, Boeing had to redesign the wiring of the aircraft to meet the more conservative JAA interpretation. As a result of these differences, two designs of the 747-400 now exist—one for FAA standards and one for JAA standards. According to Boeing officials, keeping two different designs was less costly than meeting JAA's requirement for all 747-400s produced.

According to Airbus officials, the company had to make a late design change to its A340 aircraft as a result of a difference over one regulation. In February 1991 FAA informed Airbus that the A340 design—scheduled for certification in February 1993—did not minimize the risk of damage to the fuel tanks after a "rotor burst" (engine explosion) or ensure that a significant proportion of fuel remains on board after a rotor burst. According to FAA's A340 project manager, FAA applies the rule assuming that an explosion will happen and defines the angles of trajectory after the explosion. JAA interprets the identical rule to assume that the explosion could happen and does not specifically define the angle of trajectory. According to Airbus officials, FAA's interpretation (1) differed from JAA's interpretation, (2) was new, and (3) occurred late enough in the certification process to result in design changes that unnecessarily

increased Airbus A340 production costs by over $20 million for the entire fleet.

In its recent certification program for the MD-11 aircraft, Douglas incurred a costly design change as a result of a late difference in interpretation between JAA and FAA over the same issue. Although FAA had certified the MD-11 in November 1990, JAA wrote Douglas in December 1990, stating that the company had not adequately "minimized" the hazards that could occur after a rotor burst. JAA required Douglas to reroute the hydraulic lines for aircraft exported to Europe. As a result, Douglas had to retrofit aircraft already produced for export to Europe and make design changes for all future MD-11 aircraft produced. Douglas officials stated that JAA's certification of the MD-11 aircraft had several such differences and cost the company $21 million.

Effect of Differences on the Leasing and Operation of Aircraft

Additional requirements and differences in regulatory interpretations between FAA, JAA, and other certification authorities not only increase the manufacturers' costs but also increase the costs for leasing and operating an aircraft. In April 1989 FAA, foreign aviation authorities, and leasing company representatives met to discuss these problems. At the conference, a representative of one leasing company presented the results of his review, which showed that aircraft lessors have experienced frustration, delays, and monetary cost as a result of additional requirements and further testing of aircraft by importing certification authorities.[1] For example, he found that to lease an FAA-certified Boeing 737 for operation in the United Kingdom, an operator must comply with 18 additional design requirements that increase the cost of each aircraft by $966,000. Likewise, he found that FAA requires a substantial number of design modifications on the Airbus A320 to allow it to be operated in the United States, similarly increasing costs. FAA officials acknowledged the difficulties that leasing companies faced as a result of differing certification standards.

FAA and Boeing officials stated that differing interpretations and additional requirements still present barriers to cross-border leasing and the globalization of the air transport industry. Boeing officials cited the difficulty that an FAA-certified Boeing aircraft encounters in the leasing market. For example, if Boeing delivers an aircraft to a company in country X, the aircraft is designed to be in compliance with that country's

[1]Eamon Keating, Address to AIA Industry and Air Authorities, Guinness Peat Aviation Leasing Group, April 19, 1989.

standards. If that same aircraft is then leased for use in country Y, the aircraft must be certified by that country's authority and undergo structural and flight manual changes. If the aircraft is leased back to country X, it must undergo further structural and flight manual changes to comply with that country's standards. Boeing officials emphasized that this situation is very common and costly to Boeing and the leasing companies involved.

FAA and Foreign Authorities Duplicate Certification Efforts

FAA, JAA, and foreign authorities also duplicate certification tests and analyses. Despite bilateral airworthiness agreements between FAA and other countries aimed at avoiding the costs of duplicative testing and certifying, FAA officials and all five manufacturers of transport airplanes stated that unnecessary duplication exists between authorities that sometimes costs millions of dollars for a certification project. According to these officials, such duplication is a burden because it adds little to the safety of the aircraft and wastes regulators' resources that could be spent on safety-related research and development.

Since 1982, for example, FAA has certified 12 different Boeing airplane designs. To export these aircraft, Boeing conducted over 90 foreign certification projects that cost millions of additional dollars because they involved duplicative testing and analysis. In light of their previous experiences, Boeing officials have budgeted approximately $30 million for JAA certification of Boeing's new 777 aircraft after FAA completes its certification scheduled for April 1995. Also, Boeing has budgeted additional funds to have the 777 aircraft recertified by authorities of non-European countries.

For the four airplane designs certified by FAA since 1982, Douglas has conducted 12 additional certification exercises. According to company officials, several of the exercises involved duplicative testing and analysis that cost Douglas as much as $10 million. The more costly reviews involved a 12- to 18-month evaluation by a 10- to 12-member team that flight-tested the aircraft and required changes even though FAA and other authorities had conducted such tests and certified the aircraft.

Both European and U.S. manufacturers cited many instances of duplication. For example:

- According to officials, Boeing spent approximately $500,000 in May 1989 to conduct an 11-hour flight test of the 747-400 for JAA officials even

though (1) FAA had already conducted the flight tests and certified the aircraft in January 1989 and (2) five 747-400 aircraft were already in revenue service without any problems.

- According to officials, Airbus spent approximately $3.5 million to conduct certification activities for FAA in addition to the original 1988 JAA certification of the A320 aircraft. Both Airbus officials and FAA's Aircraft Certification Service Director stated that FAA unnecessarily duplicated many of JAA's tests and analyses.
- According to Douglas officials, the company spent $21 million to obtain JAA certification of its MD-11 aircraft in 1991 after FAA had already invested 33,600 staff hours to certify the aircraft. FAA's project manager for the MD-11 stated that Douglas encountered a significant amount of duplicative testing and analysis to obtain JAA certification.
- Fokker officials stated that during the certification of the Fokker-100 aircraft, Fokker duplicated tests and analyses for aviation authorities, including FAA, that cost the company millions of dollars. Although the Netherlands authority had spent approximately 10,000 staff hours certifying the aircraft, FAA spent approximately 7,100 staff hours to conduct its own certification activities.

A recent review of the coordination between various certification authorities throughout the world found similar inefficiencies. In a report prepared for the Australian government in 1990, a former chief executive of Qantas Airlines found costly duplication of certification efforts between countries.[2] The report concluded that sufficient justification did not exist for Australia's independent assessments of aircraft already certified by FAA or JAA. The report cited a common theme of dissatisfaction and frustration with the present system among aircraft manufacturers. In discussions with both U.S. and European manufacturers, we found a similar dissatisfaction. The report concluded that unconditional acceptance of FAA and JAA certification would not affect safety. As a result of this report, Australia now accepts JAA and FAA certifications without additional tests or analysis.

FAA headquarters officials acknowledge that both domestic and foreign manufacturers encounter unnecessary and burdensome duplication to certify aircraft for export. According to FAA's International Airworthiness Officer for Certification, every major transport airplane designed since 1980 has experienced significant duplication of certification tests and analyses. Recognizing this reality, the then FAA Administrator stated in 1991 that FAA and other authorities needed to "demonstrate that we can

[2]Ronald J. Yates, Review of Policies and Practices for First-of-Type Certification of Imported Aircraft, January 1990.

move off the backs of these manufacturers and help them get an aircraft ready for commercial service without requiring them to undergo three or four certification routines for foreign airworthiness authorities, each of which is costly to the manufacturer."

Safety Resources Not Effectively Allocated

According to both FAA and JAA officials, regulatory resources spent on duplicative activities could be better used addressing other safety issues. Boeing officials stated that much of the money the company currently spends on duplicative testing and late design changes would be better spent researching such issues as human-factor-caused accidents that account for over 70 percent of all aircraft accidents. Airbus Industrie officials stated that because a high percentage of regulatory resources are involved in duplicative certifications, areas with a greater safety potential—such as operational safety and continued airworthiness—are not receiving the emphasis or action they deserve. If the inefficiencies of duplication and regulatory differences are eliminated and the freed regulatory resources are used to address other higher-priority areas, overall safety would benefit.

The Benefits of International Standards and Practices

Common standards and practices would result in significant economic benefit to both foreign and domestic manufacturers. AIA, for example, estimates that eliminating the current duplications and differences in the certification process would save U.S. aircraft manufacturers between $800 million and $1 billion over the next 10 years. FAA officials acknowledged that the development of common standards, interpretations, and practices would result in a significant economic benefit to aircraft manufacturers. However, several manufacturers emphasized that such benefits would result if the international standard developed was the most technically justified rather than a single standard that encompassed all existing regulations.

The development of such commonality could also increase the level of aircraft safety. As indicated earlier, the elimination of duplicative testing and analysis would allow FAA, JAA, and manufacturers to more effectively utilize their resources. In addition, officials from FAA, JAA, and both European and domestic manufacturers stated that a certification process based on common standards and processes would lead to a greater exchange of information on the need for new or improved standards in a given area. If the technical experts of the various certification authorities worked together to develop and interpret standards, aircraft safety and

public confidence in the system would be enhanced. As FAA's Director, Aircraft Certification Service, stated in a May 1991 speech, "nothing is to be gained through international competition between countries in their development of airworthiness standards."

Statutory Obligations Are a Major Cause of Regulatory Differences and Duplication

Although FAA and JAA as well as foreign and domestic manufacturers agree that common standards and practices would have significant economic and safety benefits, regulatory differences and duplication persist because they are rooted in individual statutory obligations. Each authority is responsible for ensuring safety in its country and has the obligation to impose requirements as it deems necessary. FAA is mandated to establish and enforce safety standards for aircraft registered in the United States. JAA is charged with a similar responsibility for Europe. As a result, a practical limitation exists that makes the development of common standards and practices difficult and problematic.

In addition, differences between standards and practices are often based on differing national experiences or concerns. For example, FAA has established requirements to prevent unhealthy ozone levels in the cabins of both domestic and international flights, while JAA has not. As a result, eliminating differences is extremely difficult because it may require compromise despite different evaluations of the safety significance of the situation under discussion.

FAA recognized this constraint when making its bilateral agreements. These agreements state that if differences in certification requirements or interpretations arise, the importing country has the right to impose its position. Through the exercise of this right, differences between authorities have developed in response to differing national experiences. According to FAA, European authorities, and domestic and foreign manufacturers, this issue presents a significant roadblock to eliminating the duplication and differences in the current certification system and producing an integrated, international system of common standards and practices.

Conclusions

International standards, interpretations, and procedures governing the design and manufacture of transport airplanes would benefit manufacturers, authorities, and the flying public. The current certification system is not efficient because differences in FAA's and JAA's interpretations of regulations and duplication of each other's activities

have resulted in significant costs to aircraft manufacturers and the inefficient use of regulatory resources. Common international standards and practices would save manufacturers millions of dollars and could increase safety through a more effective and efficient use of authorities' resources.

Without exception, the domestic and foreign manufacturers and regulators we interviewed stated that safety is their top priority and that common standards and practices would enhance safety through international cooperation and coordination. Nevertheless, regulatory differences and duplication persist because each authority has the fundamental obligation under law to independently establish its own certification requirements and procedures. The elimination of differences and duplication cannot occur without coordination and compromise that require to some extent relinquishing independence. This obvious constraint presents the greatest roadblock to the development of a more efficient certification system that both foreign and domestic authorities and manufacturers strongly advocate.

Agency Comments and Our Evaluation

In commenting on a draft of this report, DOT did not agree that the current certification system for commercial transport airplanes is not efficient. Although acknowledging that FAA and JAA differ in their interpretation of some certification regulations and that duplication exists between separate FAA and JAA certification projects, DOT contended that the current system is efficient but not as efficient as it could be. However, representatives from all five aircraft manufacturers, JAA, and other European authorities, as well as several FAA officials, told us that the current certification system is not efficient and in many cases provided evidence to support their statements. We believe the report accurately presents and attributes this information and leads to the logical conclusion that the current system is not efficient.

DOT also stated that AIA's $1-billion estimate of the savings to industry from harmonization is too high. However, in its recent report, Report to the President: Review of Regulations (April 1992), DOT used the $1-billion estimate to make the harmonization effort one of its highest-priority administrative items. In that report, DOT advised the President:

> The differences between the FAA regulations and the requirements of other nations impose a heavy burden on U.S. aircraft manufacturers and operators .... While it is impossible to give an accurate estimate of all of the cost savings that can be achieved through regulatory

harmonization, there is no doubt that very substantial savings are possible. Industry sources have advised that savings of $100 million to $1 billion can be achieved.

Later in the report, DOT itself cited the economic benefits of harmonization as being "up to $1 billion" without attributing the estimate to any other source.

Finally, DOT noted that FAA and JAA are subject to statutory constraints and that valid technical reasons may exist for some regulatory differences. We acknowledge these realities and have revised the report accordingly. However, such general statutory constraints and limited technical concerns should not be used as an excuse to delay the early identification and elimination of regulatory differences during the transport airplane certification process. As the report states, issues surrounding sovereign independence present a significant roadblock to harmonization but do not automatically prevent such harmonization.

Harmonization Effort Achieves Little Progress

Despite initiating a joint effort in 1983 and placing a high priority on harmonizing certification standards and practices in 1989, FAA and JAA have been unable to eliminate regulatory differences and duplication. FAA and JAA have not made progress in this effort because they have not developed a strategy to eliminate the differences and because European authorities have focused predominantly on coordinating their own certification requirements and processes. In addition, FAA and JAA have not developed a mechanism to identify and resolve differences early in the certification process and to reduce duplication. Recognizing that such a harmonization strategy and certification mechanism are needed, FAA, Boeing, and Airbus have recently proposed significant changes to the certification system, including the development of a strategic plan for harmonization and joint certification teams.

FAA and JAA Have Been Unable to Eliminate Differences and Duplication

FAA and JAA have made little progress in eliminating the differences and duplication that exist despite their having initiated a joint effort in 1983 and placed a high priority on that objective in 1989. The effort initiated in the early 1980s was very large, involving potential changes to hundreds of technically complex rules. FAA and JAA have made limited progress because (1) they have not developed a strategy to focus their efforts, (2) JAA has concentrated primarily on eliminating national variants from its own regulations and coordinating its own certification activities, and (3) they have not developed specific procedures to coordinate certification, prevent duplication, and eliminate interpretational differences late in the process.

Significant Regulatory Differences Between FAA and JAA Remain

Differences persist between FAA and JAA in the wording and interpretation of the regulations governing transport category airplanes.[1] In 1980, for example, FAA compared its regulations to JAA's and found 267 differences in either wording or interpretation that it believed were significant. Our review of the regulations and recent FAA and Boeing analyses show that at least 233 of those differences, or 87.3 percent, still remain. Furthermore, in a 1992 analysis Boeing found that 486 paragraphs, or 40 percent, of the 1,208 paragraphs in FAA's and JAA's regulations governing transport airplanes contained differences in wording or known interpretation; 722 paragraphs, or 60 percent, were identical both in wording and interpretation.

[1]As part of certifying the new 777 aircraft, Boeing conducted a detailed comparison of FAR 25 and JAR 25. In that analysis, Boeing identified a total of 1,208 regulations in FAR 25 and JAR 25 governing transport category airplane designs. FAA officials acknowledged that the 1,208 regulations represented the universe of FAA and JAA transport design requirements.

Causes of Lack of Progress

FAA and JAA have not made significant progress in eliminating their regulatory differences and duplication of certification activities since 1983. Several reasons have contributed to the limited progress, in addition to the independent development of regulations discussed in chapter 2.

First, FAA and JAA have not developed a management strategy that contains specific goals or time frames to eliminate key differences. Instead, FAA and JAA have established numerous working groups to address problems as they have arisen. As a result of this approach, they have not developed such key information as prioritized objectives, specific time frames, resources spent, and progress achieved. Although they are not required to do so, tracking such information would better allow FAA and JAA to effectively manage the effort to eliminate the differences and duplication. FAA officials, for example, could not provide us with a list of the working groups created during the harmonization process, an estimate of FAA resources invested in this program since 1983, or a summary of the results achieved. Similarly, JAA officials could not provide us with such information and acknowledged that many regulatory differences still exist because FAA and JAA have not yet developed a systematic approach to eliminating them. Commenting on a draft of this report, DOT agreed with the need to develop a systematic approach and stated that in June 1992 FAA and JAA had issued a strategic plan with specific time frames to initiate such an approach.

Second, a single European standard for transport category airplanes, without national variants, did not exist until 1988. Although working with FAA at five annual conferences and through numerous working groups between 1983 and 1988 in an attempt to produce common standards and practices, JAA officials focused much of their effort on finalizing JAR 25 as the European certification standard without allowing for individual country differences. The U.S. industry did not aggressively push for the elimination of differences between FAA and JAA until JAA had eliminated differences between its own members. As a result, it was not until the sixth annual conference in June 1989 that FAA and JAA established the elimination of differences as a high-priority objective.

Third, FAA has not developed specific procedures with JAA to coordinate certification tests and analyses to prevent duplication and late interpretational differences. In the opening remarks to the seventh annual FAA/JAA conference in 1990, the then FAA Administrator stated that

in the international aviation business, we can no longer tolerate two ways to do things. We want to get rid of that burden on industry. We need to develop procedures that will let technical policy makers work as if there is no line between the United States and Europe.

In February 1992 FAA's Associate Administrator for Regulation and Certification acknowledged that no real progress had been achieved in developing procedures to eliminate unnecessary duplication for separate certification projects over the last 9 years. Also, several FAA Transport Airplane Directorate officials told us that specific coordination procedures have not been developed but are needed to reduce the current level of duplication between FAA and foreign authorities and the appearance of late interpretational differences. These officials stated that FAA's development of a Memorandum of Understanding with JAA in March 1990 for the MD-11 project and of a draft memorandum for the Boeing 777 is a first step in developing such procedures.

Although the memorandum for the MD-11 contained a general description of the roles and responsibilities of each authority, FAA's MD-11 project manager and Douglas officials said that the memorandum was too general to significantly reduce JAA and FAA duplication. Despite the memorandum, late interpretational differences occurred even after FAA had certified the aircraft, as discussed earlier. FAA and JAA officials are currently drafting a more detailed Memorandum of Understanding to coordinate certification activities for the Boeing 777 project that began in 1990. For example, FAA will now verify certain test results as submitted by Boeing and will forward them to JAA. JAA will review the results and notify FAA in writing—with a copy to Boeing—of its conclusions. No such coordination agreements have been developed for FAA's certification of Airbus, Fokker, or British Aerospace aircraft imported into the United States. As a result, FAA and JAA have tended to conduct certification activities along "parallel paths" in which duplication and late interpretational differences occur, according to FAA Transport Airplane Directorate officials.

Aircraft Manufacturers Discouraged by Lack of Progress

Citing the lack of progress achieved and the substantial resources invested, both foreign and domestic manufacturers have become dissatisfied with the current harmonization process. At the eighth annual FAA/JAA conference in 1991, European and domestic manufacturers made a joint presentation in which they described the results of harmonization as "very disappointing" because the funds and staff time spent on harmonization had not resulted in any significant actions or results. As early as 1990 FAA recognized that the harmonization effort was not

progressing as expected. At the 1990 FAA/JAA conference, the former FAA Administrator stated:

> We had about 18 people at our first meeting back in 1983. And we had one objective: to harmonize our rules and regulations. We've made some progress since that first meeting. But not nearly enough. Some of the problems that should have been solved by now are still with us. . . . Let me speak frankly. I believe we must move faster.

Currently, FAA officials acknowledge that despite spending substantial resources on the harmonization effort, significant regulatory differences and duplication still exist. These officials emphasized, however, that progress is being made because FAA and JAA are developing a closer working relationship and noted that several harmonized regulations are in the final rulemaking stages. In addition, FAA officials stated—and industry representatives acknowledged—that significant progress is being made in harmonizing the standards governing general aviation aircraft (the design requirements for general aviation aircraft were outside the scope of our review). Domestic manufacturing representatives in February 1992, however, expressed their frustration with harmonization of transport airplane design requirements to FAA in writing:

> We have put in a great deal of effort on harmonization to date, with disappointingly few results. We are trying one more time. However, if the results at the June Annual FAA/JAA Meeting are not significantly more than encouraging what we've seen in the past, we will probably consider our harmonization efforts a waste of time and money, and terminate our efforts to cut our losses.

FAA Has Recently Proposed Major Changes to Improve Harmonization

Acknowledging industry criticism of the lack of specific progress, in February 1992 FAA proposed two changes to improve the harmonization effort (see app. II for FAA's proposal). First, FAA called for the development of an FAA/JAA strategic plan to establish specific objectives and time frames for the harmonization effort. JAA, AIA, and the European Association of Aerospace Manufacturers have agreed to jointly develop the plan. FAA and JAA expected to issue a final draft of the plan by the ninth annual FAA/JAA conference in June 1992. In commenting on a draft of this report provided in May 1992, DOT noted that FAA and JAA had issued the strategic plan on June 5, 1992.

Second, FAA has proposed a new certification approach for major transport airplane designs to eliminate duplication of FAA and JAA activities. FAA has proposed a new "concurrent and cooperative" approach in which

specialists from FAA and JAA would work together during the certification process. For example, JAA specialists would be integrated as part of the FAA team certifying a new Boeing aircraft design. Likewise, FAA specialists would be integrated as part of a JAA certification team for a new Airbus aircraft. JAA officials have agreed to work with FAA to develop this concept. According to DOT officials, the three projects currently in process—Boeing's 777 and Airbus' A340 and A330—are too far along to incorporate the joint team approach in total, but the approach will be used as appropriate for the stage of the programs. The fully developed approach could then be used on the next certification project started by FAA and JAA.

Boeing and Airbus Have Also Proposed Changes to Improve Certification System

Representatives from the two largest aircraft manufacturers—Boeing and Airbus—have made formal proposals to improve the efficiency of the certification system. Although emphasizing that they are very discouraged by the lack of progress since 1983 but very encouraged by FAA's recent proposals for change, Boeing officials have called for a system of "mutual recognition." Under this system, authorities of importing countries would automatically accept the certification of the exporting authority without additional tests, analyses, or requirements. According to Boeing officials, mutual recognition would save domestic aircraft manufacturers and airlines as much as $1 billion over the next 10 years. FAA officials stated that such a system would be unrealistic, given each authority's requirement under its own law to determine compliance with national safety regulations.

Airbus representatives have made a slightly different proposal—a step-by-step process to create an integrated international certification system. Although supporting the concept of mutual recognition so that aircraft manufacturers can concentrate their resources on safety improvements rather than redundant certification efforts, Airbus officials stated that several prerequisites are essential. These requirements are (1) developing JAA so that it is equivalent to FAA in international stature, (2) eliminating the differences in wording between JAR 25 and FAR 25, (3) securing an FAA/JAA commitment for joint development of new regulations, (4) eliminating the differences in the interpretation and application of rules, (5) integrating foreign authorities' observers into the original certification process for each new aircraft, and (6) creating an international arbitration board to settle any disputes between FAA, JAA, and aircraft manufacturers.

FAA and JAA Are Developing a Strategic Plan and Joint Certification Approach

FAA and JAA officials agreed with Boeing's and Airbus' position that international certification standards, interpretations, and procedures are urgently needed to reduce unnecessary costs and increase safety. However, they stated that the strategic plan and new certification approach proposed by FAA are more likely to produce the desired results. As a consequence, FAA and JAA officials—with industry participation—began drafting a strategic plan for the harmonization effort in late February 1992. At the Ninth Annual FAA/JAA Conference in June 1992, FAA and JAA issued a plan in which they committed themselves to meeting specific time frames for harmonizing regulatory differences. Both foreign and domestic industry representatives stated that they were very pleased with the plan because FAA and JAA had for the first time committed themselves to meeting time frames for the harmonization effort. These representatives stated that the plan is a good starting point for the eventual resolution of differences but expressed concern about how FAA would monitor actual progress against the plan and what actions it would take to promote progress for differences not resolved within the time frames established in the plan.

In May 1992 FAA, JAA, and industry representatives also began a separate effort to consider FAA's proposal for a new cooperative and concurrent certification approach that may eventually lead to the formation of joint certification teams. FAA and JAA officials outlined the new certification approach at the Ninth Annual FAA/JAA Conference and stated that the specifics of the new approach would be developed over the next year. According to FAA officials, this approach will take several years to fully develop and implement. Although endorsing the approach, officials from several manufacturers expressed concern in light of their previous experience that FAA and JAA will never fully develop and implement such a system. These officials emphasized that FAA and JAA made similar commitments in 1989 and 1990 without subsequent progress. (See app. III for selected correspondences between aircraft manufacturers and aviation authorities.)

Conclusions

Although FAA and European authorities have been working to eliminate the differences in the transport airplane design standards for about 9 years, they have achieved limited progress toward that end, in part because they had not—until June 1992—developed a strategy to focus their efforts. Recognizing the need for such a management focus, FAA proposed the development of a joint FAA/JAA strategic plan in February 1992. FAA and JAA issued the plan in June 1992. We are encouraged by this development of a

management focus. Although the plan is a good starting point for the eventual resolution of regulatory differences, we believe that FAA must periodically monitor the progress made relative to the time frames established in the plan.

We recognize that even with common standards some interpretational differences will likely occur between FAA and JAA. As a result, a mechanism is needed to identify and resolve such differences early in the certification process. Domestic and foreign manufacturers as well as FAA have made proposals to create such a mechanism, including the establishment of joint certification teams. We believe that such teams have merit from both economic and safety perspectives.

We also recognize that progress has been limited because a significant push for harmonization did not occur until after 1988 when JAA issued the first JAR 25 without national variants. Despite this push, little has been achieved in the last few years. FAA and JAA, however, now appear poised to develop and implement a strategy that will lead to real progress. If the strategic plan is used as a management tool to measure the effectiveness of their efforts and the concept of joint certification teams is fully developed, FAA and JAA will produce a more efficient certification system that will benefit authorities, manufacturers, and the flying public.

Recommendations

To help ensure that the recent momentum in the harmonization effort results in the identification and resolution of regulatory differences and avoidance of duplication between FAA and JAA early in the aircraft certification process, we recommend that the Secretary of Transportation direct the Administrator, FAA, to

- monitor and annually report to the Secretary on the progress achieved relative to time frames established in the strategic plan and make programmatic changes as needed to ensure that the plan results in the resolution of regulatory differences and
- develop specific mechanisms, such as joint teams, to coordinate certification activities with JAA and prevent unnecessary duplication and late interpretational differences in certifying a transport airplane design.

Agency Comments and Our Evaluation

Commenting on a draft of this report provided to it in May 1992, DOT stated that it has already responded to the draft report's recommendation that FAA establish priorities and time frames for the harmonization effort. At

the Ninth Annual FAA/JAA Conference in June 1992, FAA and JAA developed a strategic plan in which they committed themselves to meeting specific priorities and time frames. This report has been revised to acknowledge the progress made at that conference. We have also revised our recommendation to help ensure that FAA monitors actual progress against the plan and makes programmatic changes as needed to ensure that the plan results in the resolution of regulatory differences.

DOT concurred with our recommendation that FAA develop specific mechanisms, such as joint teams, to coordinate certification activities with JAA. DOT stated that it expects to formalize a working agreement with JAA during the next year. FAA and JAA officials provided a broad outline of this agreement at the Ninth Annual FAA/JAA Conference but noted that many of the specific elements of this new concurrent and cooperative approach still need to be developed.

FAA Relationship to Domestic Manufacturers Differs From European Structure

The relationship between certifying authorities and aircraft manufacturers differs substantially in the United States and Europe. First, several European authorities charge manufacturers directly for certification activities while FAA does not. Second, FAA uses designated representatives employed by Boeing and Douglas to conduct many certification tests and analyses while European authorities do not use aircraft manufacturers' employees to perform this function. Third, European manufacturers are much more involved in the development of new regulations than U.S. manufacturers. Finally, proposed FAA regulations undergo formal cost/benefit analyses while JAA regulations do not.

Several European Certification Authorities Charge User Fees

Unlike FAA, several European certification authorities charge for their certification activities. These user fees usually involve full cost recovery from the manufacturers for work performed by the authority in certifying aircraft. FAA, on the other hand, conducts certification activities using federal funds.

Four countries currently require both foreign and domestic aircraft manufacturers to pay the entire costs of their certification activities—the United Kingdom, Sweden, Denmark, and Italy. The United Kingdom, for example, charged Douglas $1.2 million for British Civil Aviation Authority labor, lodging, and travel associated with JAA's certification of the MD-11 aircraft. The French Directorate General for Civil Aviation charges the manufacturer for travel and lodging during a certification. Several other certification authorities, such as those in Germany, Spain, and the Netherlands, also charge manufacturers for some certification expenses. FAA does not charge manufacturers directly for certification activities.

Currently, JAA does not charge manufacturers directly for certification activities. Instead, JAA allows each member nation to bill the manufacturer directly for certification costs. JAA members have agreed in principle, however, to implement a funding system in which manufacturers pay for the entire cost of a JAA certification. Under this agreement, JAA would charge the manufacturer with a single invoice to cover the sum of each individual country's certification costs on that project. Each member nation would then invoice JAA for its efforts. According to JAA officials, although internal difficulties concerning the implementation of this system exist, it is possible that the system will be in place by July 1993.

FAA Depends on Designated Manufacturer Engineers to Conduct Certification Tests

FAA relies heavily upon designated engineering representatives (DER) employed by Boeing and Douglas to conduct certification tests and analyses. Section 314 of the Federal Aviation Act authorizes the FAA Administrator to delegate examination, testing, and inspection tasks associated with certification to qualified persons who are not FAA employees. According to officials, FAA could not fulfill its certification mission without using DERs. The European certification authorities we interviewed did not use such a system.

FAA's Transport Airplane Directorate employs 288 staff to certify transport category aircraft. This staff depends upon the 447 DERs at Boeing and 243 at Douglas to conduct a majority of the certification tests and analyses. DERs are usually nominated by the manufacturer and then accepted by FAA's directorate. DERs assist FAA in determining whether an aircraft design complies with the relevant regulations. In this capacity, DERs are bound by the same requirements and procedures as FAA employees but are still employed by the manufacturers. FAA, however, usually approves all major flight tests and witnesses all major tests, such as final flight tests. According to FAA officials, the increase in aviation activity over the last decade and budget constraints have caused FAA to depend heavily on DERs.

The European authorities we visited do not employ a designee system. JAA conducts certification activities through teams comprising representatives from member countries. Some member authorities use other organizations. For example, under the Air Navigation Order of 1989, the British Civil Aviation Authority can approve entire organizations to produce reports and analyses that the authority then reviews. For instance, British Aerospace is an approved organization that produces certification reports and analyses that the British authority evaluates. In addition, the French employ an independent private organization known as Bureau Veritas for surveillance of manufacturers' production practices.

Differences Between JAA's and FAA's Rulemaking Process

FAA's process of developing new regulations for the design and manufacture of new aircraft differs significantly from JAA's. JAA's rulemaking process is an informal, collaborative effort between European aviation authorities and aircraft manufacturers. FAA's rulemaking process is a more structured exercise in which legal requirements prescribe the type of communication that may properly take place between FAA and aircraft manufacturers. According to both domestic and European certification authorities and manufacturers, the European system gives manufacturers a much greater influence on the development and content

of new regulations than the domestic system. In addition, JAA's cooperative approach has enabled JAA to finalize regulations much faster than FAA. Partially in response to industry concerns about differences in FAA's and JAA's rulemaking, FAA implemented in February 1991 the Aviation Rulemaking Advisory Committee (ARAC) to increase industry's participation in the development of new regulations and streamline its rulemaking process.

Industry Participation in JAA's Rulemaking System

European aircraft manufacturers heavily influence the development of new regulations through an informal JAA rulemaking structure. New JAA regulations are drafted by technical study groups that include representatives from European aircraft manufacturers, airlines, and pilot unions. According to JAA officials, these representatives take an active role in developing new regulations and have a substantial influence on their content. Aircraft manufacturing representatives also comprise the majority of members on several technical study groups. For example, of the 14 members of JAA's study group that develop regulations governing aircraft structures, 8 represent European aircraft manufacturers and 6 represent European aviation authorities.

The technical study groups must reach a consensus before a rule is sent to JAA's Joint Steering Assembly that also has representatives of European aircraft manufacturers as members. JAA thus often obtains the "buy-in" of industry to new requirements early in the rulemaking process. Rules approved by the Joint Steering Assembly are sent to the JAA Executive Board for final approval. The Executive Board, which meets monthly, comprises aviation authority representatives from Britain, France, Germany, and the Netherlands, plus one other official from a "smaller" JAA country—currently Sweden—for a 2-year term.

Through this collaborative effort, JAA is able to develop and finalize new regulations much faster than FAA, according to JAA and FAA officials. Both JAA and FAA officials estimated that JAA takes approximately 2 years to develop and finalize regulations as compared with an average of 7 years for FAA. However, JAA officials could not estimate the effect that the recent European Community Act, making JAA regulations Community law, would have on the speed of JAA's rulemaking process. In the future, the European Community will review and approve all proposed JAA regulations.

Industry Participation in FAA's Rulemaking System

European rulemaking systems such as JAA's were developed in a culture that is more concerned with using industry expertise than ensuring that all

interested parties participate in the process, according to various European officials. U.S. administrative requirements were developed to protect the public and ensure openness, fairness, and public participation in the rulemaking process. As a result, domestic aircraft manufacturers' participation in the development of new FAA regulations is very limited in comparison to European manufacturers' participation in JAA's rulemaking. In commenting on a draft of this report, DOT disagreed that U.S. industries' participation in developing new regulations is limited compared to European manufacturers' and noted that FAA receives industry input during the preliminary rulemaking development phase. JAA, Boeing, Douglas, Airbus, Fokker, British Aerospace, European Association of Aerospace Manufactures, and AIA, as well as many FAA officials we interviewed, stated that U.S. aircraft manufacturers' participation in the development of new FAA regulations is very limited in comparison to European manufacturers' participation in the development of JAA's regulations. Those comments still seem to us to be valid.

Unlike JAA, which involves industry throughout the process, FAA teams formally charged with developing new regulations consist solely of FAA officials. The teams must comply with various laws, including the Administrative Procedure Act, Federal Reports Act, Paperwork Reduction Act, Sunshine Act, and National Environmental Policy Act, and Executive orders, including Executive Order 12291, which requires a formal cost/benefit analysis for each proposed regulation. In addition, because the Administrative Procedure Act controls the kind of interaction FAA can have with industry during the formal rulemaking process, the teams must document all verbal contacts with industry after FAA issues a notice of proposed rulemaking and requests public comments. FAA must then respond in writing to the comments before finalizing the regulation.

According to several FAA officials and representatives from Boeing, Douglas, and AIA, the development of new regulations takes on an adversarial tone between FAA and the manufacturers. Industry representatives stated that they often have very little influence on the development or content of proposed regulations. Douglas officials characterized FAA's rulemaking process as a battle in comparison to JAA's "hand in glove" exercise with industry. FAA officials acknowledged that JAA's rulemaking process is much more cooperative with industry than FAA's process. In commenting on a draft of this report, DOT disagreed that the U.S. rulemaking process was adversarial. DOT noted that although interested parties do not always agree and that lengthy discussions are needed to resolve differences, the U.S. process is comprehensive and

participatory: Rules are developed through the consideration of many viewpoints about how best to achieve the common goal of safety. However, several FAA officials, as well as representatives from Boeing, Douglas, and AIA, stated that the development of new regulations often takes on an adversarial tone between FAA and the manufacturers. We have accurately reported and attributed these statements.

Recognizing that its current rulemaking structure for safety regulations was inefficient and greatly limited the participation of interested parties in the development of new regulations, FAA created ARAC on February 5, 1991, consistent with the provisions of the Federal Advisory Committee Act. ARAC comprises FAA officials and representatives of 58 groups, including domestic and foreign aircraft manufacturers and other interested parties. Each of nine subcommittees develops information and positions on proposed FAA regulations in its technical area. Although ARAC does not eliminate any of the current FAA rulemaking steps or legal requirements, its purpose is to improve the process by providing FAA with contributions from interested parties much earlier. FAA expects that ARAC will improve the sometimes adversarial relationship with aircraft manufacturers and make the rulemaking process more efficient. According to FAA officials, it is too early to determine whether ARAC has been effective because FAA has not formally assessed the progress achieved, the problems encountered, industry's response, the effect on harmonization, and the impact on FAA's rulemaking process. FAA plans to recharter ARAC with the Congress in February 1993.

Proposed FAA Regulations Undergo Formal Economic Analysis

FAA must conduct a formal cost/benefit analysis for proposed regulations; JAA does not have this requirement. Executive Order 12291, issued in February 1981, requires that every major rule be accompanied by a cost/benefit analysis, including an analysis of less expensive alternatives to the rule and an explanation of why those alternatives could not be adopted. The Office of Management and Budget reviews each regulatory impact analysis. The rule cannot be promulgated until this review is complete. JAA officials stated that they consider the cost of a regulation informally through discussions with industry representatives in the technical working groups. However, these officials stated that if a clear and sufficient safety benefit can be obtained from a new requirement, cost alone would not prevent implementation of the requirement. These officials stated that they favor the development of some sort of formal cost/benefit analysis for JAA—although less rigorous than the U.S. requirements.

Other Factors Could Affect Harmonization Activities

Officials from FAA and JAA as well as domestic and foreign manufacturers stated that the time it takes FAA to issue a regulation could have a negative impact on the harmonization process. According to these officials, rules that are harmonized would be implemented much sooner by JAA, resulting in continuing differences. In addition, changes to the proposed regulation resulting from the U.S. process would require further harmonization. For example, FAA and JAA officials have agreed on a regulation that would eliminate differences governing rejected takeoff performance. According to both FAA and JAA officials, JAA is in the final decision-making process to implement the necessary regulation, while FAA is at least 1 year away from implementing its rule. FAA officials noted that the Office of Management and Budget is reviewing the regulation.

In addition, foreign and domestic manufacturers stated that FAA often issues guidance material—known as issue papers—that contains new requirements. In general, FAA uses issue papers to document key areas of concern for the manufacturer during the certification of an aircraft. According to manufacturers, FAA also uses issue papers to impose new requirements because its rulemaking process would take too long to implement a regulation. FAA's Associate Administrator for Regulation and Certification and other officials acknowledged that issue papers sometimes contain new requirements because the necessary regulation to address a new technology is not available. Many foreign and domestic manufacturing representatives believed that FAA's use of issue papers to impose new requirements could have a negative effect on harmonization if the new requirements differed from JAA's and the issue papers appeared late in the certification process. In commenting on a draft of this report, DOT noted that "characterizing the papers as 'rulemaking' presents an inaccurate impression of legitimate decisions that (a manufacturer) may not agree with, but which reflect the correct application of existing rules." However, several FAA officials acknowledged the legitimacy of foreign and domestic manufacturers' complaints by stating that issue papers are sometimes used to impose new requirements because the rulemaking system would take too long to implement the necessary regulation.

Finally, foreign authorities and manufacturers as well as domestic manufacturers stated that their experience with ARAC to date suggests that it will not significantly improve FAA's rulemaking system. According to these officials, the current structure is too unwieldy and unmanageable to achieve significant progress. As a result, JAA officials have reduced their participation in ARAC activities. Domestic manufacturers stated that ARAC has improved the dialogue between them and FAA but has not improved

the efficiency of FAA's rulemaking process. FAA officials, however, emphasized that it is too early to evaluate the effectiveness of ARAC.

Conclusions

Several significant differences exist between FAA's relationship to domestic manufacturers and the relationship of European authorities to their manufacturers. Although several European authorities charge manufacturers for certification activities and JAA is likely to do so in the future, FAA does not directly charge manufacturers for its work. FAA depends on a designee system not used in Europe. Finally, JAA's rulemaking process is more expeditious than FAA's principally because discussions and collaboration with manufacturers occur at the very beginning of the process. By law, however, FAA is required to follow a formal sequence of activities once a proposed rule is published for comment.

Therefore, FAA created ARAC to increase industry participation in the development of regulations and streamline the rulemaking process. Although it was not our intent to propose that FAA should adopt JAA's system or that JAA should adopt FAA's system, we are encouraged by FAA's having established ARAC and ARAC's potential to positively affect FAA's rulemaking process. Like FAA, we believe that it is too early to determine whether ARAC will improve FAA's process. However, when considering whether to recharter ARAC, FAA and the Congress would benefit by having information—achievements, problems, and impacts—to evaluate the advisability of extending ARAC's term or to suggest other actions that could improve FAA's rulemaking process.

Recommendation

When submitting the Department's proposal to the Congress for rechartering ARAC, we recommend that the Secretary of Transportation direct the Administrator, FAA, to report on (1) the results achieved through ARAC, (2) the problems encountered during its implementation, (3) FAA's actions taken to overcome the problems, (4) ARAC's effect on FAA/JAA harmonization activities, and (5) ARAC's impact on FAA's rulemaking process.

Agency Comments and Our Evaluation

DOT stated that it would report to the Congress the recommended information concerning the effectiveness of ARAC if the Congress expresses its need for such information. Given the importance that FAA has placed on the ARAC structure and concerns expressed to us by foreign authorities and

manufacturers as well as domestic manufacturers about ARAC's implementation, we believe that both FAA and the Congress would benefit by having information to evaluate the advisability of extending ARAC's term and to suggest other actions that could improve FAA's rulemaking process. We do not believe that DOT should wait for the Congress to ask for this information. DOT should take the initiative to keep the Congress informed in this important area.

DOT also stated that our discussion regarding European authorities not using designated representatives or designees was not completely accurate. DOT contended that although European authorities do not depend upon designated representatives paid by the manufacturers per se, they use a similar system in which national aviation authorities approve organizations to carry out certain certification tasks. Although some European authorities do use other organizations to assist in carrying out certification tasks, none that we visited employed a "designee" system in which individuals employed by aircraft manufacturers were authorized to conduct design certification tests and analyses. Foreign and domestic manufacturing representatives, as well as foreign aviation officials and numerous FAA certification staff, cited FAA's use of designees as a major difference between the U.S. and European certification systems. We believe that this distinction was adequately described in the draft report, and therefore we have made no revision to this report.

Countries With Bilateral Airworthiness Agreements With the United States

Argentina
Australia
Austria*
Belgium*
Brazil
Canada
China
Czechoslovakia
Denmark*
Finland*
France*
Germany*
Indonesia
Israel
Italy*
Japan
Netherlands*
New Zealand
Norway*
Poland
Romania
Singapore
South Africa
Spain*
Sweden*
Switzerland*
United Kingdom*

*JAA member countries.

Source: Federal Aviation Administration.

Recent FAA Proposals to JAA for Change in the Certification System and Harmonization Effort

U.S. Department
of Transportation

**Federal Aviation
Administration**

800 Independence Ave., S.W.
Washington, D.C. 20591

FEB 7 1992

Mr. H.N. Wolleswinkle, Directeur
Directie, Luchtvaartinspectie
Rijksluchtvaartdienst
P.O. Box 575
2130 AN HOOFDDORP
The Netherlands

Dear Henk:

I am writing to you in your capacity as the current Chairman of the Joint Aviation Authority (JAA) Executive Board to present for the Board's consideration the Federal Aviation Administration's (FAA) suggestions in preparation for the next and following annual FAA/JAA "harmonization meetings." As the Board knows, I have had recent informal discussions on these suggestions with Board members Ron Ashford and Claude Frantzen. I also understand progress was made along these lines at the January 22 planning meeting by Board member Klaus Koplin and Craig Beard, Director, Aircraft Certification Service, in Washington, DC, with U.S. and European industry representation.

I agree that the next, and future, annual FAA/JAA harmonization meetings should become an executive level review of an FAA/JAA harmonization work program document. The work program document would then become a "living document" to be used by all participants. The document we envision would be structured as a listing of the various harmonization initiatives underway. The objective or "terms of reference" for each initiative would be stated, and the document would provide milestone dates against which we, the authorities, and industry could measure progress. Also, the document should be segmented into two lists, a "short list" of our highest priority initiatives and a longer list of lower priority initiatives. Aircraft certification, flight operation, and maintenance initiatives should be included.

After Craig Beard's return from your Executive Board meeting last October, he and Tom Accardi, Director, Flight Standards Service, began to pull together lists of both Aircraft Certification and Flight Standards initiatives they have underway, including those supported within our field-located Aircraft Certification directorates. I understand you are doing the same thing and that a meeting is planned for February 27, in Hoofddorp, to merge our

lists and to begin work with industry representatives to identify the highest priority initiatives (i.e., the "short list"). At the February meeting, the process of assuring a common understanding on the objectives of each initiative and of establishing milestones will begin. The document would be completed in "final draft" form prior to the meeting in June. Discussion and final joint FAA/JAA approval of the harmonization work program would then be the major product of the June meeting.

At the 1993 harmonization meeting, and in following years, progress according to the work program would again be reviewed and amendments would be approved for the following next years work.

This brings me to my next suggestion. We at FAA, and I think JAA, believe that eliminating the unnecessary burdens imposed on the aircraft manufacturers and operators, through the conduct of separate FAA and JAA type certification projects on new models, is one of the most important objectives of our harmonization efforts. Unfortunately, no real progress has been made in this regard over the past 9 years. Therefore, we believe that a new harmonization initiative (for the short list), having top management commitment at FAA and JAA, to complete cooperative and concurrent certifications of both the Airbus A-330 and Boeing Model 777 basic airplane designs is imperative. We are not advocating the "single certificate to be accepted by all" concept put forward by industry representatives on both sides of the Atlantic, but we do believe that significant progress is within our reach using the "cooperative and concurrent" concept. This would entail reaching a commonly agreed type certification basis, participation by the importing authorities certification specialists in pre-agreed areas of special interests during the lead (or exporting) authority's certification program, and the issuance of our respective type certificates on the same day. Claude Frantzen sketched out this basic concept during his informal meeting with a group of U.S. airframe and engine manufacturer's representatives on January 17 at Dulles Airport, and it was raised again by Klaus Koplin and Craig Beard at the January 22 planning meeting with U.S. and European industry representatives.

Notwithstanding the strong advocacy both FAA and JAA have heard for a "single certificate," Craig Beard has had informal discussion with senior management officials at both Boeing and Douglas, and he believes they will support the "concurrent and cooperative" concept if there is top management resolve at both FAA and JAA to make it happen. I can assure you of FAA's resolve.

Craig Beard and Leroy Keith, Manager, Transport Airplane Directorate, will be attending the March JAA Executive Board for other agenda subjects. However, with the Executive Board's

agreement, they would be prepared to bring more specific proposals on the "concurrent and cooperative" type certification approach for discussion and to talk more specifically about integrating JAA participation into the FAA type certification program on the Boeing Model 777. They would also be prepared to talk about integrating FAA certification specialists' participation in the JAA joint certification program for the Airbus A-330. I believe it is important that we work through the details and be in a position to announce our shared resolve at the June meeting.

I look forward to your reply.

Sincerely,

Anthony J. Broderick
Associate Administrator for
Regulation and Certification

Selected Correspondence Between FAA, JAA, and Aircraft Manufacturers Concerning Harmonization

Don Fuqua
President

October 23, 1990

Admiral James B. Busey, Administrator
Federal Aviation Administration
800 Independence Avenue, SW
Washington, DC 20591

Dear Admiral Busey:

Rapid worldwide increase in air travel; growth of the cross-border leasing, chartering and transfer of aircraft; and general development of international cooperation in the design and production of civil transport aircraft illustrate some important features of the changes the aviation world is facing. This increasing globalization of aviation makes it imperative to achieve a far closer international cooperation in the certification and regulatory procedures in order to maintain the current high level of safety of air transport without undue financial and schedule impacts. The last years' progress within the European system (strengthening of the JAA organization, elimination of National Variants in the existing joint regulations, extension of regulatory and certification activities in the operations and maintenance fields) make this cooperation possible.

Both AIA and AECMA decided some years ago to contribute jointly to this harmonization effort, considering that safety should not be the subject of international competition but would result from coordinated work of all the interested parties (authorities, operators, manufacturers). The aging aircraft issue is a good example of such successful coordination. A specific work program is being finalized between AIA and AECMA to identify future priority items and develop associated harmonization proposals.

In the past there have been excessive delays on the part of the FAA and JAA for publication of corresponding NPRM/NPA or petition for rule change which has caused AIA and AECMA to question the interest of continuing their internal joint program for FAR/JAR harmonization proposals.

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RECEIVED

Aerospace Industries Association of America, Inc.
1250 Eye Street, N.W., Washington, D.C. 20005 (202) 371-8400

However, the last 2 annual FAA/JAA/Industry meetings showed that both FAA and JAA share this willingness of harmonization. Particularly, at the San Francisco meeting of June 1990, your opening remarks constituted an insistent appeal to move faster and to intensify joint efforts. It now appears necessary that some clear commitments be taken by the Authorities for a concrete implementation of this intention.

We therefore, request that appropriate coordinated actions be taken within FAA and JAA in the following areas:

a) Current tendency to over-regulate (e.g., rotorcraft-small aircraft) should be eliminated and any new proposed airworthiness regulations should be limited to cases corresponding to a need supported by experience or a new technology issue.

b) No new rulemaking activity should be started unilaterally by JAA or FAA. Initial proposals developed by one party should be circulated to the other and a joint position reached before the issue outside the Authorities of a draft for industry review.

c) Significant improvements should be brought in order to reduce the delays associated with internal FAA administrative procedures for NPRM publication and subsequent adoption of rules amendments, when they are aimed towards FAR/JAR harmonization.

d) FAA and JAA should take appropriate coordinated actions to meet the target set up in the Attachment for the main issues previously discussed.

e) FAA and JAA should present their work schedule for up-dating of the bilateral agreements between the USA and the European countries in order to cover maintenance matters, some operational matters (MMEL-ETOPS) and noise certification.

We would appreciate FAA and JAA reaction to each request of this letter and its Attachment.

Sincerely,

Don Fuqua

DF:jpa

04681

cc: AECMA

US Department of Transportation
Federal Aviation Administration

Office of the Administrator

800 Independence Ave., S.W.
Washington, D.C. 20591

JAN 29 1991

Mr. Don Fuqua
President, Aerospace Industries
Association of America, Inc.
1250 Eye Street, NW.
Washington, DC 20005

Dear Don:

This is in further response to your letter of October 23 concerning the harmonization of Federal Aviation Administration (FAA) and Joint Aviation Authorities (JAA) certification and regulatory procedures.

I share your excitement and concerns about the internationalization of the aviation industry. Although this trend is not new, the current pace of change is unprecedented. As you know, I consider these issues among the agency's top priorities. The FAA has committed significant resources to the Federal Aviation Regulations (FAR) (JAR) Joint Aviation Requirements harmonization effort. The results of that investment are coming to fruition with the effort on FAR/JAR 25 nearly complete, the FAR/JAR 23 harmonization scheduled to be completed by April 20, 1991, and the FAR/JAR 21, 27, 29, 33 groups continuing to make progress. The FAA and JAA have always viewed the harmonization effort as an ongoing concern. To that end, the FAA, JAA, and industry meet several times a year at all levels, from executive sessions to technical working group meetings, to discuss all activities, but most importantly rulemaking.

In regard to your request for coordinated action (Items a. through e.), we offer the following replies:

a. "Current tendency to over-regulate (e.g., rotorcraft-small aircraft) should be eliminated and any new proposed airworthiness regulations should be limited to cases corresponding to a need supported by experience or a new technology issue."

FAA Response: Many of the recently completed and current rulemaking projects are the result of congressional mandates, crashworthiness improvements, technological advances, or a result of the Part 23, 27, and 29 Airworthiness Reviews. These rulemaking efforts are necessary to keep the regulations current. Some of these rulemaking activities are:

The fatigue/flaw tolerance rule of October 27, 1990, which follows a similar FAR Part 25 rule by 11 years, was coordinated extensively over a 7-year period and includes provisions responsive to rotorcraft design and substantiation techniques.

The occupant restraint rules in FAR Parts 23, 25, 27, and 29 are now similar.

Rule 4 (Airframe), issued on February 26, 1990, completed the rotorcraft review process which began in 1979.

The JAR harmonization rule of September 21, 1990, specifically responded to harmonization proposals of the European authorities and input from Aerospace Industries Association of America, Inc. and European Association of Aerospace Manufacturers.

Our Rotorcraft and Small Airplane Directorates work very closely with industry during the rulemaking process. They have reported to me that in the past few years all the rules issued have had the support of industry. I think we are already regulating on an "as needed" basis. In addition we are also in the process of harmonizing our regulations internally and externally.

b. "No new rulemaking activity should be started unilaterally by JAA or FAA. Initial proposals developed by one party should be circulated to the other and a joint position reached before the issue outside the authorities of a draft for industry review."

FAA Response: We notify JAA as soon as a rulemaking project is initiated, and they do the same for us. This allows the respective agencies to get early participation from each other. The derivative aircraft project is a good example of this early participation process. However, it is not often possible for the FAA and JAA to reach a consensus prior to the need for industry input. Nor do I think it is healthy for the JAA and FAA to operate in a regulatory vacuum. Your proposal also tends to ignore the special relationship between the JAA and AECMA. I think it is beneficial for all the parties concerned to participate from the beginning of a rulemaking project. This participatory procedure will result in a quality product that is responsive to all parties.

c. "Significant improvements should be brought in order to reduce the delays associated with internal FAA administrative procedures for NPRM publication and subsequent adoption of rules amendments, when they are aimed at FAR/JAR harmonization."

FAA Response: I wholeheartedly agree with your proposal. This topic was the main theme of my speech to the International Federation of Airworthiness, November 19, 1990, in Toulouse, France. The FAA is ready to move rapidly toward harmonization of world aviation rules and regulations. To this end, we are setting up an advisory committee to help us streamline our rulemaking process. The committee participants will

represent the broad spectrum of the aviation community. The FAA and JAA want to work closely with industry on harmonization issues; therefore, it is vital that the world aerospace industry reach a level of agreement that will allow it to present a unified viewpoint. I ask that you work with us in these efforts.

d. "FAA and JAA should take appropriate coordinated actions to meet the target date set up in the Attachment for the main issues previously discussed."

FAA Response: See enclosure.

e. "FAA and JAA should present their work schedule for up-dating of the bilateral agreements between the USA and European countries in order to cover maintenance matters, some operational matters (MMEL-ETOPS), and noise certification."

FAA Response: Currently, the FAA is evaluating procedural methods that might be used to implement bilateral agreements which encompass aircraft maintenance, operations, and noise certification. Since we are only in the feasibility study stage, it would be premature to state a schedule for updating bilaterals.

Sincerely,

James B. Busey
Administrator

Enclosure

Benjamin A. Cosgrove
Senior Vice President

Boeing Commercial Airplane Group
P.O. Box 3707, MS 7Y-97
Seattle, WA 98124-2207

April 23, 1991

BOEING

Mr. Anthony J. Broderick
Associate Administrator for Regulation
and Certification, AVR-1
Federal Aviation Administration
800 Independence Avenue SW
Washington DC, 20591

Dear Tony,

During our meeting in Washington DC on April 10, I left you a one page summary, entitled "FAR/JAR Differences", and promised you that I would prepare a letter that discussed our concerns in more detail. I have also taken the opportunity to expand a bit more on two related topics that address the need for a refocusing of rulemaking activities and on the vital importance of World Aviation Standards.

These concerns are very important to us at The Boeing Company. All of them involve the FAA, but none are caused by or can be solved solely by the FAA. I believe that it is time to get everything out on the table so that you are fully aware of our concerns and we understand your position. The goal is to eliminate incorrect perceptions and get to the facts. I suggest that a meeting take place prior to the Eighth Annual FAA/JAA Meeting in June.

Sincerely,

B. A. Cosgrove

Enclosure

cc: Leroy Keith

BOEING CONCERNS IN INTERNATIONAL RULEMAKING AND CERTIFICATION

I. FAR/JAR DIFFERENCES: Each time a new airplane or major derivative is certified, differences and inconsistencies between the FARs and the airworthiness standards of other aviation authorities result in unnecessary Boeing efforts in design, certification and manufacturing, and unnecessary airline operating costs. (By "unnecessary efforts" we mean efforts which do not increase safety.)

Based on our past written and oral dialog, it is obvious that we disagree on how big a problem this is. This difference of opinion may be due to the lack of sufficient information or detail. The following provides additional information and, we hope, opens the door for future discussions.

A. HARMONIZATION: An example is FAR 25.571, fatigue life. For many years FAA has used a scatter factor of 3. This has been proven out by extensive service experience. The Joint Aviation Authorities (JAA), however, favor a scatter factor of 5, which cuts the life limit by 40%. We continue to be frustrated by the tendency in harmonization for the FAA and JAA to simply gravitate to the more conservative of the two standards. We feel that FAA should be willing to stand up and defend the FARs when they have been proven by service experience. It is very important to us that FAA defend its position.

Key to this issue is the acceptance that the airworthiness authorities are chartered to produce government standards which will result in an appropriate level of safety and the understanding that manufacturers may elect to design to higher standards for various business reasons.

We feel that better participation by FAA specialists is required to ensure that harmonization does, in fact, occur. This requires travel funds, since half the meetings are in Europe.

B. RULEMAKING: We are aware that FAA is considering changes to the bird strike requirements which would impose an 8 lb bird damage condition for the wing and windshield (damage tolerance), in addition to the current empennage requirement. We disagree with such an action for the following reasons:

1. It is not needed for safety. No service experience exists that would indicate the current standards need upgrading. The design changes result in increased structural weight and increased operating costs, with no resultant safety benefit.

2. This rulemaking activity wastes valuable time and resources of the authorities and manufacturers, which could have been devoted to solving real safety problems.

3. This unilateral FAA action further increases the differences between the FARs and JARs.

C. CONTINUED AIRWORTHINESS: An example is the Combi Airworthiness Directive (AD). FAA action was first. The JAA requested FAA participation in the development of the joint European action. FAA failed to attend two key consecutive authority/industry meetings in England on 10/16/90 and 1/25/91. The JAA came up with its own draft version of an AD which overkills the problem (including fire covers and an overzealous training program). The result so far is that one of our best 747 Combi customers in Europe has informed us that if the JAA draft is finalized, combi operations will no longer be economically feasible, and they won't buy any more combis.

It would obviously be unfair to blame FAA for JAA's actions, but our point here is that in the current international arena, once FAA starts something, they need to follow it through to completion in close cooperation with the JAA (and other airworthiness authorities, as required).

Also, in fairness, we should point out that FAA did attend the last meeting with the JAA, and that FAA has recently shown a commendable willingness to listen to and understand airline concerns, and to take appropriate actions with the recent combi NPRM.

II. THE CURRENT THRUST OF WORLDWIDE RULEMAKING ACTIVITIES

We have recently come to realize that the entire worldwide aviation community, Boeing included, has for years been working primarily on improving a part of the aviation system which is the primary cause factor of very few accidents -- i.e. the FAR 25 certificated airplane. In fact, over the last 30 years, the airplane has been the primary cause factor of only 11.0% of the hull loss accidents, while the flight crew has been the primary cause factor of 74.5%.

We feel that with over 60 years of constant attention to FAR 25 and its predecessors, the transport airplane certification rules are mature, although there is an occasional need to update for new technology or unacceptable service experience. Further churning up new rules outside those two categories (e.g. the 8 lb bird) just wastes time and resources without decreasing the accident rate.

We feel it's time for the entire aviation community to take a new look at regulatory activities and devise a means of using scientific numerical analysis to determine where the aviation community's combined resources could be deployed to prevent the most accidents and save the most lives. We would like to begin a dialog with FAA on this.

III. WORLD AVIATION STANDARDS: I think we all agree that our ultimate goal is to have the same high standards of safety worldwide. A great deal of time and money would be saved if we could eliminate the waste of certificating airplanes several times for different authorities with different rules, and cut the costs of paper-shuffling to transfer registry of aircraft from one country to another, then redoing maintenance programs, AFMs, etc., whenever an aircraft is sold or leased to another country.

Perhaps the time has come for us to discuss this common goal and begin planning to eventually achieve it. The benefits of such an achievement would be realized by all parties in the aviation community, particularly the travelling public, because more time would be available to address true safety problems and their causes.

AECMA

ASSOCIATION EUROPEENNE DES CONSTRUCTEURS DE MATERIEL AEROSPATIAL

175, rue Jean-Jacques Rousseau
Technopolis
92138 ISSY-LES-MOULINEAUX CEDEX
Téléphone: (1) 47.36.98.76
Télécopie: (1) 47.36.83.04
Télex: 634287 F
N° SIRET 784 855 629 00019
APE 9723

Paris, 16th September 1991

Mr H.N. WOLLESWINKEL
R. L. D.
P.O. Box 575
2130 AN HOOFDDORP

THE NETHERLANDS

HP/JVS/MS - 22997

SUBJECT : FOLLOW ON OF SCHEVENINGEN MEETING

Dear

As stated at the end of the FAA/JAA/Industry meeting held in Scheveningen last June, both European and US manufacturing industry was strongly disappointed by the lack of concrete results. No clear answer was obtained to the issues raised in the AIA/AECMA/GAMA presentations, the list of which was further provided at the small private session preparing the general closing session.

You will find attached herewith the same list. We would kindly request that JAA consider seriously these issues, prepare and coordinate with FAA a work schedule for joint answering and, in any case, let AECMA know the clear JAA position on all the items. A first response would be appreciated at the next JSA meeting.

Yours sincerely

H. PERRIER

Copy :
JAA - E.B. members
JAA Secretary

FAR/JAR HARMONIZATION
AIA INITIAL STATEMENTS

The following statements apply to all the attached harmonization items:

1. As soon as possible after the February 26-27 harmonization meetings in Hoofddorp between AIA, AECMA, FAA, and JAA, the appropriate technical specialists/managers from industry be involved in the development of the harmonization work program in their respective technical areas. Thus the FAA/JAA Harmonization Work Program Document presented in Toronto in early June, 1992, should have the buy-in of the technical people who will have to do the real work called out in the document. This includes setting the schedules and milestones. In the past we have seen that schedules set by authoritites alone are often too slow. All schedule planning should be firmed up at the March 27 meeting.

2. The harmonization process should not be a simple "tweaking of words" to bring the FARs and JARs together. The technical people involved should look at the big picture of that regulation before they pick up a red pen and start tweaking words. Basic questions should first be asked and answered such as:

- What are the basic safety-related reasons behind this regulation?
- How has this regulation(s) served in the past in terms of the safety record? Which parts of the regulation have been effective? Which parts have not?
- Which parts of this regulation(s) give a high payoff in safety? Which don't?
- Is the regulation clear and unambiguous?
- Does the associated advisory material also meet the above criteria?

Only after these and other basic questions are answered can the specialists sit down and write a good harmonized rule.

3. In the past, all too often "harmonization" has simply resulted in the authorities compromising at or near the outer envelope of the two regulations. We feel this unfortunate tendency would cease if the suggestion in item 2 above were followed.

4. We have put in a great deal of effort on harmonization to date, with disappointingly few results. We are trying one more time. However, if the results at the June Annual FAA/JAA Meeting are not significantly more encouraging than what we've seen in the past, we will probably consider our harmonization efforts a waste of time and money, and terminate our efforts to cut our losses.

Comments From the Department of Transportation and Our Response

U.S. Department of Transportation

Assistant Secretary for Administration

400 Seventh St S.W.
Washington D.C. 20590

July 7, 1992

Mr. Kenneth M. Mead
Director, Transportation Issues
U.S. General Accounting Office
441 G Street, N.W.
Washington, D.C. 20548

Dear Mr. Mead:

Enclosed are two copies of the Department of Transportation's comments concerning the U.S. General Accounting Office draft report entitled, "Aviation Safety: Limited Progress on Developing International Aircraft Standards."

Thank you for the opportunity to review and comment on this report. If you have any questions concerning our reply, please contact Patricia Parrish, Director of Management Planning on 366-4747.

Sincerely,

Jon H. Seymour

Enclosures

DEPARTMENT OF TRANSPORTATION (DOT) REPLY

TO

GENERAL ACCOUNTING OFFICE (GAO) DRAFT REPORT

ON

LIMITED PROGRESS ON DEVELOPING

INTERNATIONAL AIRCRAFT STANDARDS

RCED-92-179

I. SUMMARY OF GAO FINDINGS AND RECOMMENDATIONS

The GAO examined international issues related to certifying commercial transport aircraft and found that current methods are inefficient because the Federal Aviation Administration (FAA) and the European Joint Aviation Authorities (JAA) differ on their interpretation of certification regulations and duplicate activities. The GAO draft report asserts that while the FAA and JAA initiated a joint effort in 1983 to harmonize international aircraft certification standards, little progress has been made, in part because the JAA did not have a consolidated standard until 1988. The GAO found that FAA and JAA recently began to develop a strategic plan to eliminate differences and are exploring various mechanisms to make international commercial aircraft certification more efficient.

The draft report recommends that the Secretary of Transportation direct the FAA Administrator to:

1. Use the strategic plan now being developed to (a) establish priorities for addressing those regulations and interpretations that can most significantly affect future certifications; and (b) set time frames for accomplishing the specific tasks necessary to reconcile differences.

2. Develop specific mechanisms, such as joint certification teams, to coordinate certification activities with JAA and prevent unnecessary duplication and late interpretational differences in certifying an aircraft design.

3. Report on the following when submitting the proposal to the Congress for rechartering the Aviation Rulemaking Advisory Committee (ARAC): (a) the results achieved through ARAC; (b) the problems encountered during its implementation; (c) FAA actions to overcome problems; (d) ARAC's effect on FAA/JAA harmonization activities; and (e) ARAC's impact on FAA's rulemaking process.

See comment 1.

See comment 2.

II. SUMMARY OF THE DEPARTMENT OF TRANSPORTATION POSITION

While the draft report presents extensive information regarding the remaining differences in standards and interpretations between the FAA and the JAA, the Department maintains that recognizing the significant harmonization progress that has already occurred would provide a more balanced presentation. Considering all the activities required over the five-year period it typically takes to type certify transport category airplanes, the FAA and JAA standards are remarkably harmonized already. This does not diminish the need for further harmonization in the remaining areas; nevertheless, credit could be given for the high degree of harmonization that already exists and the work in progress. The Department has identified harmonization as a high priority item for departmental action at the conclusion of the regulatory moratorium.

The Department concurs with the draft report's principal recommendations. The GAO has been provided with a copy of the Harmonization Work Program, dated June 5, 1992, which documents the harmonization initiatives between the FAA and the JAA. This work program, which includes milestone dates, was jointly developed and agreed to by the FAA and JAA. It provides a management tool for FAA and JAA to monitor harmonization progress. In addition, the FAA has been working with individual certification authorities for years on joint certification projects and is formalizing a working agreement with the JAA which is expected to be finalized during the next year. The recommended elements of the FAA's report to the Congress on ARAC in GAO's third recommendation can be provided if the Congress expresses its need for such information.

III. DETAILS OF THE DEPARTMENT OF TRANSPORTATION POSITION

Harmonization effort scope

The limited scope of the draft report does not provide a full appreciation of the magnitude of harmonization efforts. The draft report addresses only "design" requirements. The importance of "production" requirements and their harmonization deserve emphasis to provide a complete understanding of their significant impact on airplane safety. Generically, the entire certification process typically encompasses design, production, airworthiness certification, and continuing airworthiness requirements. For example, when we undertake the assessment of an applicant country's civil airworthiness authority and its regulatory certification system during Bilateral Airworthiness Agreement (BAA) Assessments, we assess and evaluate the applicant country's entire certification process, with specialized discipline teams, which includes their design, production, airworthiness certification, and continuing airworthiness controls.

See comment 3.

The draft report repeatedly discusses standardization and harmonization of design standards and criteria, specifically for the transport category airplane applicable to Federal Aviation Regulation (FAR) and Joint Aviation Requirements (JAR) Part 25. The ultimate safety of these aircraft does not rest solely on a commonality of adequate and proven designs between the two authorities. Equally important is a commonality in the production and quality control requirements used in the manufacture of these aircraft. As a result, an effort is also underway to standardize and harmonize the production certification requirements of each authority, namely FAR and JAR 21.

Statutory and technical constraints

See comment 4.

Throughout the draft report GAO concludes that concerns regarding independence and an unwillingness to compromise are the major causes of regulatory differences and duplication in the airplane design certification process. This does not recognize the statutory, legislative, and technical constraints on the system. The FAA and JAA are subject to statutory constraints that in many instances preclude compromise. Further, it also does not acknowledge that there may be valid technical reasons for the regulatory differences. The FAA, as the agency charged by statute with certifying that airplanes used by U.S. airlines comply with applicable standards, rules and regulations cannot "delegate" this responsibility to a foreign government, nor can it abandon valid technical concerns in the interest of compromise. Nonetheless, the report could identify the numerous examples where FAA and JAA have reached compromises in areas where statutory authority permits.

See comment 5.

Further, the draft report could benefit by conveying a more complete discussion regarding the nature of JAA. The JAA is not a statutory regulatory authority -- it is only a coordinating organization. As such, it has no authority to grant any type of certificates; that must be done separately by each of its member countries. It has no authority to directly charge for its services or to delegate certification responsibilities to organizations or private citizens. We recommend that the draft report be revised to ensure that all comparisons between the FAA and JAA clearly take into account this fundamental difference in statutory authority.

Designated representatives

The discussions in the draft report regarding European authorities not using designated representatives or designees is not completely accurate. While European authorities do not use designees per se, they use a similar system in which the national aviation authorities approve organizations that approve data in a manner similar to the method designees operate in the United States. For example, nearly all findings for the Civil Aviation

See comment 6.

Authority in the United Kingdom are made by organizations approved to act on its behalf. Similarly, the French aviation authority contracts out all of its manufacturing quality control responsibilities and much of its engineering resources. The report could provide expanded information regarding the European system's operation and its similarities to the FAA's designee system.

IV. SPECIFIC COMMENTS

Now on pp. 2, 8, 16. See comment 7.

1. Executive Summary, line 19, and pages 8 and 18 - The draft report incorrectly states that FAA, through its Aircraft Certification Service is responsible for certifying that aircraft or their designs are "safe." The FAA is not responsible for certifying that aircraft or their designs are "safe." Rather, the Federal Aviation Act of 1958 empowers the FAA to issue type certificates for an aircraft which "meets the minimum standards, rules, and regulations prescribed by the Administrator." This important and basic distinction has been upheld by the U.S. Supreme Court in the "Varig" decision.

See comment 7.

Now on pp. 2, 15, 21. See comment 8.

2. Executive Summary, line 38 - We do not concur with the statement that appears here and on pages 17 and 26 that "the current certification system is not efficient." We maintain that it is efficient, but not as efficient as it could be. The FAA's certification system and the JAA's certification system are quite efficient for their originally intended purpose of certifying domestically produced aircraft. The FAA's system is long established and mirrored by many countries worldwide as the preeminent certification system.

Now on p. 2. See comment 9.

3. Executive Summary, lines 38 and 39 - We do not agree with the categorical statement that the "FAA and JAA differ on their interpretation of certification regulations." A more accurate statement would be that FAA differs with JAA on the interpretation of some certification regulations.

Now on p. 4. See comment 10.

4. Executive Summary, lines 106 through 109 - This statement is only true in the context of separate certification projects. It was not intended to refer to the differences between certification rules in which significant progress has been made during the past decade.

Now on p. 5. See comment 9.

5. Executive Summary, line 142 - Delete "seek Congress' approval."

6. Page 8, first sentence - This sentence is inaccurate both in its reference to FAA's certification responsibility (see comment 1), as well as its statement "imported by the United

See comment 9.

States." The United States Government does not import; individuals and companies import aircraft into the United States. The last sentence of page 8 repeats the inaccuracy.

See comment 9.

7. Page 8, footnote - The footnote presents an inaccurate definition of transport category aircraft. FAA's only definition of "transport category" is those airplanes that comply with Part 25. Propeller-driven airplanes with 10 to 19 occupants and maximum weights between 12,500 and 19,000 pounds may be either Part 23 commuter or Part 25 transport category airplanes. All other airplanes with more than nine occupants or takeoff weights greater than 12,500 pounds must be transport category. The practical impact of the inaccuracy is that it does not include the business jets that are transport category airplanes.

Now on p. 8. See comment 9.

8. Page 9, first paragraph, second sentence - Suggest rewrite to "FAA's certification of aircraft designs to FAR 25 usually takes place over the typically five-year aircraft development process, ..."

Now on p. 8. See comment 9.

9. Page 9, first paragraph, third sentence - Delete "decentralized" as it inaccurately characterizes the organization. The aircraft certification organization has field offices, like most FAA organizations, but has centralized management. Also, add the following as the paragraph's last sentence: "All Directorates report to the Director, Aircraft Certification Service in Washington, D.C."

See comment 11.

10. Page 9, second paragraph - The draft report refers to the FAA's establishment of BAA's with 27 other nations. It also goes on to say that these agreements are to "facilitate the import and export of certified aircraft....." This is not accurate and could be rewritten to reflect that BAA's are developed for multiple purposes, including the reciprocal import and export of engines, propellers, and other components. Further, BAAs vary in the number and types of items included.

Now on p. 15. See comment 9.

11. Page 17, first paragraph, last sentence - Delete "right" and replace with "obligation, under its national law." Delete "its own" replace with "appropriate." See also comment 4.

Now on p. 16. See comment 9.

12. Page 18, last paragraph, third sentence - Suggest rewrite sentence to "Because the 747-400 was a derivative of the 747-300 and had an identical floor in the upper deck, FAA did not require the aircraft to meet a new rule that required the upper deck floor to be designed ..."

Now on p. 16.

13. Page 19, second paragraph, last sentence - We do not agree with the Airbus comment as conveyed by GAO in the draft report, that this was a "new" interpretation. It followed

See comment 12.

established written technical guidance material for analyses that had been applied to other airplane type designs. The technical guidance material was available to Airbus well before they "froze" the design of their airplane.

Now on pp. 17, 18. See comment 13.

14. Page 21, first paragraph - It is not accurate to state that structural changes have to be removed. If country X requires increased structural strength in some areas of the airplane that country Y does not, we know of no reason country Y would require their removal if operated in that country.

Now on p. 20. See comment 14.

15. Page 24, first paragraph, first and third sentences - Replace the word "regulatory" with "certification."

Now on p. 20. See comment 15.

16. Page 24, first paragraph, last sentence - Delete the word "regulatory."

Now on p. 20. See comment 16.

17. Page 24, second paragraph, second sentence - Delete "...and stated that AIA's estimate was reasonable." The FAA does not agree that AIA's estimate was either reasonable or supported by data. There may be some potential savings, but $1 billion is very high.

Now on p. 20. See comment 17.

18. Page 24, second paragraph, last sentence - This sentence should be omitted because it describes modifying the rules to make them less costly, not harmonization.

Now on p. 21. See comment 9.

19. Page 25, second paragraph - We suggest a rewrite to replace the word "Independence" in the paragraph's title with "Statutory Obligations." Also suggest first sentence rewrite to ..."because they are rooted in individual statutory obligations for governments to establish safety standards which historically was done independently." Suggest rewrite second sentence to "...for ensuring safety in its sovereign country and has the obligation to impose...."

Now on p. 21. See comment 9.

20. Page 25 continuing onto page 26, last sentence - Suggest rewrite to "...concern about this issue and measurements of unhealthy ozone levels on both U.S. domestic and international flights, while JAA has not."

Now on p. 21. See comment 9.

21. Page 26, first paragraph, first sentence - Suggest rewrite sentence to "...it may require compromise despite different evaluations of the safety significance of the situation under discussion."

Now on p. 21. See comment 9.

22. Page 26, second paragraph, third sentence - Suggest rewrite beginning of sentence to "Through exercise of this right, differences between ...."

Now on p. 21. See comment 9.

23. Page 26, second paragraph, fourth sentence - Suggest rewrite sentence to "... and foreign manufacturers, this fundamental issue presents a significant ...."

Now on p. 21. See comment 18.

24. Page 26, second paragraph - Add as last sentence to paragraph "The FAA, as the agency charged by statute with certifying that airplanes used by U.S. airlines comply with applicable standards, rules and regulations cannot "delegate" this responsibility to a foreign government.

Now on p. 22. See comment 9.

25. Page 26, last sentence continuing onto page 27 - Replace "fundamental right" with "obligation under law." After "... certification requirements and procedures," insert "and historically these requirements have been established independently."

Now on p. 24. See comment 19.

26. Page 28, first paragraph, second sentence - Suggest rewrite to "...this effort because the task itself is very large and involves potential changes to literally hundreds of technically complex rules, and ... requirements and processes to establish a single "European market."

Now on p. 24. See comment 20.

27. Page 28, second paragraph - Insert the following after the first sentence. "The appendix to this report is an example of the number of areas where technical differences exist between the FAA and the JAA rules for just one of dozens of "parts" of the existing FAA regulations. This illustrates the magnitude of the "harmonization" task facing FAA and JAA." The suggested appendix is included as attachment 1 to these comments.

Now on p. 24. See comment 21.

28. Page 28, second paragraph, second sentence - Suggest rewrite to "... made limited progress in harmonizing their certification requirements because ...."

Now on p. 25. See comment 9.

29. Page 29, fifth paragraph, second sentence - Replace "constraint of independence" with "independent development of regulations."

Now on p. 25. See comment 9.

30. Page 30, second paragraph, first sentence - Insert "transport category" after "...a single European ...."

Now on p. 28. See comment 9.

31. Page 33, second paragraph - The joint team approach may not be used in total on Boeing's 777 and Airbus' A330, but will be used as appropriate considering the stage of the programs.

Now on p. 28. See comment 22.

32. Page 33 - The draft report does not mention that significant harmonization rules are in the final stages of regulatory development, including, lg stall, and flutter and vibration.

Now on p. 28. See comment 9.

33. Page 34, first paragraph, second sentence - Insert "automatically" after "...importing countries would ...."

Now on p. 28. See comment 23.

34. Page 34, first paragraph, fourth sentence - Delete words "politically" and "independence." Insert "requirement under its own law to determine compliance with national safety regulations," after "...given each authority's ...." Also, we maintain that the $1 billion savings estimate is overstated.

Now on p. 32. See comment 24.

35. Page 38, second paragraph, last sentence - Suggest rewrite to "... activities funded principally, 75 percent, by user fees including a ticket tax and a fuel tax, with the remainder funded by general tax revenues." The FAA's method of funding these activities is similar to that used by the Europeans where the user of the service bears the primary financial burden for that service.

Now on p. 32. See comment 25.

36. Page 39, first paragraph, last sentence - Suggest rewrite to "...charge manufacturers directly for its certification activities, because it is funded principally from user fees."

Now on p. 33. See comment 6.

37. Page 39, third paragraph, last sentence - Suggest rewrite to "... authorities we interviewed use a somewhat different system."

Now on p. 34. See comment 6.

38. Page 40, second paragraph - This paragraph is not accurate. As previously stated, the JAA is now only a central coordinating body. Several of the authorities who make up the JAA do employ designees or equivalents. For example, nearly all findings for the Civil Aviation Authority in the United Kingdom are made by organizations approved to act on its behalf. Similarly, the French aviation authority contracts out all of its manufacturing quality control responsibilities and much of its engineering resources.

Now on p. 34. See comment 9.

39. Page 41, first paragraph, last sentence - Delete "Recognizing these differences." Add to end of sentence: "in part in response to industry concerns about FAA and JAA differences."

Now on p. 35. See comment 26.

40. Page 42, third paragraph, last sentence - We strongly disagree with the assertion that U.S. industries' participation in developing new FAA regulations is limited compared to the JAA. Industry input is provided extensively during preliminary phases in preparation for regulatory development. In addition industry has been providing additional input into the process through ARAC.

Now on p. 35.

41. Page 42, last paragraph - The statement that FAA teams charged with developing new regulations are comprised solely

of FAA officials is not accurate. While it is true that the Administrative Procedure Act does limit industry participation during the formal rulemaking period, the FAA can and invariably does involve industry during the informal development phase of the rulemaking. Also note that it is the Administrative "Procedure" Act, not "Procedures."

See comment 27.

Now on p. 35. See comment 28.

42. Page 43, second paragraph - The development of new regulations is characterized as "adversarial." This is not an accurate characterization. It is true that not all interested parties share a common view and that lengthy discussions are needed to resolve these differences, but the process is comprehensive, participatory, and considers all perspectives. All involved share a common goal of safety, but how it is achieved is subject to differing opinions. The strength of the current rules is that they were developed considering many viewpoints.

Now on p. 36. See comment 9.

43. Page 43, third paragraph, first sentence - Insert "for these and other safety regulations" after "...current rulemaking structure ...." Delete "Negotiated Rulemaking Act" and replace with "Federal Advisory Committee Act."

Now on p. 37. See comment 29.

44. Page 44, second paragraph, last two sentences - This is not an effective example. The "agreement" included retroactivity, but JAA could not provide for retroactivity at the time their proposal was published because their rules are not yet complete, and the agreement broke down.

Now on p. 37. See comment 30.

45. Page 45, second paragraph - The characterization of issue papers as documents that contain new requirements, because the rulemaking process would take too long to implement a regulation, is incorrect. Issue papers sometimes contain new requirements because technology being presented for certification is new and the necessary regulations to address novel technology are not available. Issue papers are also a method of communication between the authority and the applicant. Characterizing the papers as "rulemaking" presents an inaccurate impression of legitimate decisions that an applicant may not agree with, but which reflect the correct application of existing rules. Any new requirements that may be in the issue papers because of new technology are eventually formally proposed as special conditions in accordance with FAR 21.16.

Now on p. 37. See comment 31.

46. Page 45, second paragraph, last sentence - We maintain that the conclusion drawn in this sentence is conjecture unsupported by evidence. Further, its position after information attributed to FAA's Associate Administrator for Regulation and Certification implies that the conclusion may be attributed to him, which would be inaccurate.

Now on p. 38. See comment 32.

47. Page 45, third paragraph, first sentence - Replace "improve" with "expedite."

Now on p. 38. See comment 6.

48. Page 46, first paragraph, second sentence - As discussed earlier, Europe does use a type of designee system. Suggest rewrite to "The FAA depends on a different type of designee system from that used in Europe."

See comment 33.

49. Throughout the draft report - The term "transport aircraft" is used to represent what is apparently intended to be "transport airplanes." The aviation industry and the FAA define aircraft as a generic term meaning any device used for flight in the air. Thus, airplanes, balloons, helicopter, and airships are all aircraft. We believe the draft report would be more accurate if it referred to "transport airplanes" throughout.

Attachment 1

Proposals for regulation revisions and additions in the Systems notice for harmonization with proposed JAR 23 for normal, utility, and aerobatic category airplanes contain proposals for the following sections:

23.75	C	Landings
23.677	C	Trim systems
23.697	C	Wing flap controls
23.701	C	Flap interconnections
23.729	C	Landing gear extension and retraction systems
23.735	C	Brakes
23.775	C	Windshields and Windows
23.783	C	Doors
23.785	C	Seats, berths, letters, safety belts and shoulder harnesses
23.787	C	Baggage and Cargo compartments
23.807	C	Emergency exits
23.841	C	Pressurized cabins
23.853	C	Compartment interiors
23.867	C	Lightning protection of structure
23.1303	C	Flight and navigation instruments
23.1307	C	Miscellaneous equipment
23.1309	C	Equipment, systems and installations
23.1311	C	Electronic display instrument systems
23.1321	C	Arrangement and visibility
23.1323	C	Airspeed indicating system
23.1337	C	Powerplant instruments installations
23.1351	C	General
23.1353	C	Storage battery design and installations
23.1361	C	Master switch arrangement
23.1365	C	Electrical cables and equipment
23.1383	C	Taxi and landing lights
23.1401	C	Anti-collision light systems
23.1431	C	Electronic equipment
23.1447	C	Equipment standards for oxygen dispensing units
Appendix F		
91.205	C	Powered civil aircraft with standard U.S. airworthiness Certificate: Instrument and equipment requirements
91.209	C	Aircraft lights
23.691	N	Artificial Stall Barrier System
23.745	N	Nose/Tail-wheel steering
23.1359	N	Electrical system fire and smoke protection
23.1451	N	Fire protection for oxygen equipment
23.1453	N	Protection of oxygen equipment from rupture

This list includes FAR 23 regulations that will require changes or deletions, and any new JAR 23 regulations that would affect the basic FAR 23: C-change, D-deletion, N-new requirement.

Subparts C & D

23.301(d)	C	Loads
23.307(b)	C	Proof of structure
23.341	C	Gust loads factors
23.345	C	High lift devices
23.347	C	Unsymmetrical flight conditions
23.349	C	Rolling conditions
23.371	C	Gyroscopic loads
23.373	C	Speed control devices
23.391	C	Control surface loads
23.393	N	Loads parallel to the hinge line
23.395	C	Control system loads
23.399	C	Dual control system
23.415	C	Ground gust conditions
23.421	C	Balancing loads
23.455	C	Ailerons
23.473(c)	C	Ground load conditions and assumptions
23.499	C	Supplementary conditions for nose wheels
23.561(d)&(e)	C	General - Emergency landing conditions
23.607	C	Self-locking nuts
23.611	C	Accessibility
23.629	C	Flutter
23.679	C	Control system locks
23.737	C	Skis
23.745	N	Nose/tail-wheel steering
23.755	C	Hulls
23.773	C	Pilot compartment view
Appendix A		Simplified Design Load Criteria for Conventional Single-Engine Airplanes of 6,000 Pounds or Less Maximum Weight

This list includes FAR 23 regulations that will require changes or deletions, and any new JAR 23 regulations that would affect the basic FAR 23: C-change, D-deletion, N-new requirement.

Subpart E

23.903(c)(g)& (h)	C	Engines
23.905	C	Propellers
23.907	C	Propeller vibration
23.925	C	Propeller clearance
23.929	C	Engine installation ice protection
23.933	C	Reversing systems
23.959	C	Unusable fuel supply
23.963	C	Fuel tank: General
23.973	C	Fuel tank filler connection
23.1041	C	General
23.1043	C	Cooling tests
23.1045	C	Cooling test procedures for turbine engine powered airplanes
23.1047	C	Cooling test procedures for reciprocating engine-powered airplanes
23.1061	C	Installation
23.1091	C	Air induction
23.1093	C	Induction system icing protection
23.1143	C	Engine controls
23.1153	C	Propeller feathering controls
23.1203	C	Fire detector system

Basic JAR 23 - Issue 4, Subpart A, B & G
List of FAR 23 Rules that must be changed
to accommodate the basic JAR 23 Proposal

This list includes FAR 23 regulations that will require changes or deletions, and any new JAR 23 regulations that would affect the basic FAR 23 (prior to Amendment 34): C-change, D-deletion, N-new requirement. It should be noted that some of these changes are similar to later changes incorporated by Notice 2 and others are covered in Notice 4. Additional definitions for inclusion into Part 1 will also be required.

Subpart A

23.1	C	Applicability
23.2	D	Special retroactive requirements
23.3	C	Airplane categories

Subpart B

23.23	C	Load Distribution limits
23.25	C	Weight limits
23.45	C	General
23.49	C	Stalling speed
23.51	C	Takeoff speeds
23.53	N	Takeoff distance
23.63	N	Climb: general
23.65	C	Climb: all engines operating
23.66	N	Takeoff climb: one-engine-inoperative
23.67	C	Climb: one-engine-inoperative
23.69	N	En-route Climb/descent
23.71	N	Glide (Single-engine-airplane)
23.73	N	Referenced Landing Approach Speed
23.75	C	Landing distance
23.77	C	Baulked landing
23.141	C	General
23.143	C	General
23.145	C	Longitudal Control
23.147	C	Directional and lateral control
23.149	C	Minimum control speed
23.151	C	Aerobatic maneuvers
23.153	C	Control during landings
23.155	C	Elevator control force in maneuvers
23.157	C	Rate of roll
23.161	C	Trim
23.175	C	Demonstration of static longitudinal stability
23.177	C	Static directional and lateral stability
23.179	D	Instrumented stick force measurements
23.181	C	Dynamic stability

23.201	C	Wings level stall
23.203	C	Turning flight and accelerated turning stalls
23.205	D	Critical engine inoperative stalls
23.207	C	Stall warning
23.221	C	Spinning
23.233	C	Directional Stability and control
23.235	C	Operation on unpaved surfaces
23.237	N	Operation on water
23.251	C	Vibration and buffeting
23.253	C	High speed characteristics

Subpart G

23.1513	C	Minimum control speed
23.1519	C	Weight and center of gravity
23.1521	C	Powerplant limitations
23.1522	N	Auxiliary power unit limitations
23.1525	C	Kinds of operation
23.1527	C	Maximum operating altitude
23.1529	C	Instructions for continued airworthiness
23.1543	C	Instrument markings: general
23.1545	C	Airspeed indicator
23.1549	C	Powerplant instruments
23.1553	C	Fuel gravity indicator
23.1555	C	Control markings
23.1557	C	Miscellaneous markings and placards
23.1559	C	Operating limitations placards
23.1563	C	Airspeed placards
23.1567	C	Flight maneuver placard
23.1581	C	General
23.1583	C	Operating limitations
23.1585	C	Operating procedures
23.1587	C	Performance information
23.1589	C	Loading information

GAO Comments

1. DOT states that although differences in standards and interpretations remain, significant harmonization has already occurred and suggests that our report recognize this. During our review, however, FAA did not provide us with any specific examples of such progress, nor did DOT provide any specific examples of such progress in its response. Both FAA officials and domestic manufacturing representatives told us that progress had been made in the harmonization of regulations governing general aviation airplane designs. However, the harmonization of such requirements was outside the scope of our review, which focused on transport airplanes.

DOT notes that it has recently identified harmonization as a high-priority item for departmental action. DOT did so in its recent Report to the President: Review of Regulations (Apr. 1992). Our draft report on which DOT commented did not acknowledge this because we were provided a copy of its report to the President after our draft report had been provided to DOT on May 20, 1992. Our report has been revised to acknowledge DOT's identification of harmonization as a high-priority item.

2. DOT states that it has already responded to the draft report's recommendation that FAA establish priorities and time frames for the harmonization effort. At the Ninth Annual FAA/JAA Conference in June 1992, FAA and JAA developed a strategic plan in which they committed themselves to meeting specific priorities and time frames. Our draft report was provided to DOT in May 1992, before the conference. We have revised our report to acknowledge the progress made at that conference. We have also revised our recommendation to help ensure that FAA and JAA use the newly developed strategic plan as a management tool to measure and promote progress in harmonization.

DOT also stated that it would report to the Congress the recommended information concerning the effectiveness of ARAC if the Congress expresses its need for such information. Given the importance that FAA has placed on the ARAC structure and concerns about ARAC's implementation expressed to us by foreign authorities and manufacturers as well as domestic manufacturers, we believe that both FAA and the Congress would benefit from having such information to evaluate the advisability of extending ARAC's term and to suggest other actions that could improve FAA's rulemaking process. We do not believe that DOT should wait for the Congress to ask for this information. DOT should take the initiative to keep the Congress informed in this important area.

3. DOT states that our report is limited to transport airplane design requirements and does not address the effort under way to harmonize production certification requirements contained in Federal Aviation Regulation part 21. We agree that the harmonization effort is very large; it involves potential changes to hundreds of technically complex rules, including regulations other than those governing the design of transport airplanes. However, it was not our intent to review the harmonization of production requirements or other sections of the Federal Aviation Regulations. As we stated in the draft report, our review of the harmonization of design requirements is the first in a series of reviews we plan to undertake of FAA's aircraft certification program. We have expanded our discussion to clearly show the scope of our work. The harmonization of other aviation requirements may be discussed in later reports.

4. DOT states that FAA and JAA are subject to statutory constraints. DOT also states that valid technical reasons may exist for some regulatory differences. Our report has been revised to acknowledge these realities. However, general statutory constraints and limited technical concerns should not be used as an excuse to delay the early identification and resolution of regulatory differences in the certification process. As our report states, issues surrounding sovereign independence present a significant roadblock to harmonization but do not prevent such harmonization, which we believe can be achieved through the use of a focused strategy and management oversight by FAA and JAA.

DOT also states that FAA cannot delegate its responsibilities to a foreign government or abandon valid technical concerns in the interest of compromise. Nowhere in our draft report did we state that FAA should delegate such responsibilities. Instead, we highlight a fundamental roadblock to developing international aircraft design standards—each authority's obligation under law to independently establish its own certification requirements and procedures.

5. DOT states that our description of JAA was incomplete and has provided us with additional information. Our report has been revised to include this information.

6. FAA depends upon designated officials paid by aircraft manufacturers to conduct a majority of the design certification tests and analyses. Although some European authorities use other organizations to assist in carrying out certification tasks, none that we visited employed a "designee" system

in which individuals employed by aircraft manufacturers were authorized to conduct design certification tests and analyses. Foreign and domestic manufacturing representatives, as well as foreign aviation officials and numerous FAA certification staff, cited FAA's use of designees as a major difference between the U.S. and European certification systems. We believe that this distinction was adequately described in the draft report, and therefore we have not revised this section.

7. DOT disagreed with our statement that the Federal Aviation Act requires that commercial aircraft registered in the United States have their designs certified as safe. DOT states that FAA is not responsible for certifying aircraft or their designs as safe but rather for issuing type certificates for an aircraft that meets minimum standards, rules, and regulations prescribed by the Administrator. Section 603 of the act, however, states that the criterion for issuing a type certificate is a finding that the aircraft "is of proper design, material, specification, construction, and performance for safe operation, and (that it) meets the minimum standards, rules, and regulations prescribed by the Administrator." (Emphasis added.)

In United States v. Varig (467 U.S. 797), the U.S. Supreme Court stated that the principal duty to ensure that an aircraft design conforms to FAA safety regulations lies with the manufacturer, while FAA retains the responsibility for policing compliance. However, FAA sets the safety design standards in the first place. We believe that such statements in the act and by the U.S. Supreme Court support a general statement that commercial aircraft registered in the United States have their designs certified as safe.

8. DOT states that the certification system is efficient but not as efficient as it could be. However, representatives from all five aircraft manufacturers, JAA, and other European authorities, as well as several FAA officials, stated that the current certification system is not efficient because FAA and JAA differ in their interpretation of certification regulations and unnecessarily duplicate activities. These statements are accurately presented and attributed in the sentence to which DOT refers.

9. The report has been revised to reflect this comment.

10. Our report has been revised to clarify that FAA's Associate Administrator for Regulation and Certification was referring to unnecessary duplication between separate FAA and JAA certification

projects when he stated that little progress had been made over the last 9 years.

11. DOT contends that our statement that Bilateral Airworthiness Agreements (BAA) were developed to "facilitate the import and export of certified aircraft" is inaccurate. We disagree. FAA's own advisory circular on BAA (Advisory Circular 21-18) states:

> The BAA's . . . are technical agreements . . . intended only to facilitate the reciprocal acceptance of test results, certificates, or marks of conformity issued by the airworthiness authority of the exporting country. Without such arrangements, product manufacturers could incur a substantial, unnecessary burden of repetitive certification testing and analysis for each importing country, without recognition of the efforts completed for domestic certification. The BAA's are intended to reduce these burdens by facilitating liaison between the FAA and the airworthiness authorities of the other Contracting State to ensure that the airworthiness (safety) standards of the importing country are satisfied through maximum use of the exporting country's certification system.

We believe that our statement accurately summarizes FAA's own statement.

12. Airbus officials stated that FAA's interpretation differed from JAA's interpretation, was new, and occurred late enough in the certification process to result in significant additional and unnecessary cost. In addition, JAA's Regulation Director confirmed that FAA's interpretation in this case was different from JAA's. We have accurately presented this view and attributed it to Airbus officials where necessary.

13. DOT states that it is not accurate to state that structural changes have to be removed. Nowhere in the paragraph DOT cites, however, do we state that "structural changes have to be removed." We believe that DOT may have misread the paragraph. Boeing officials not only provided us with this example but also reviewed and edited our presentation of it. The paragraph has been appropriately attributed to Boeing officials.

14. Throughout our report, we refer to FAA and other aviation authority resources as "regulatory" resources. Such government agencies as FAA are regulatory agencies. As a result, we have not revised the sentence to which DOT refers.

15. DOT provided no support for this suggested editorial change, and therefore none was made.

16. DOT states that AIA's estimate of the $1 billion in savings to industry from harmonization over the next 10 years is too high. However, in its recent report Report to the President: Review of Regulations (Apr. 1992), DOT used this $1-billion estimate to make the harmonization effort one of its highest-priority administrative items. In that report, DOT advised the President:

> The differences between the FAA regulations and the requirements of other nations impose a heavy burden on U.S. aircraft manufacturers and operators . . . . While it is impossible to give an accurate estimate of all of the cost savings that can be achieved through regulatory harmonization, there is no doubt that very substantial savings are possible. Industry sources have advised that savings of $100 million to $1 billion can be achieved.

Later in the report, DOT cited the economic benefits of harmonization as being "up to $1 billion" without attribution.

We find it unusual that DOT would disagree with an estimate that it not only cited but used as its own in a report to the President on the long-term benefits of harmonization. In addition, in direct response to our question concerning AIA's estimate, FAA's Director, Aircraft Certification Service—in the presence of FAA's Associate Administrator for Regulation and Certification—termed it "reasonable." Again, we find it surprising that DOT now states that the estimate is too high. However, in light of DOT's official comment, the report has been revised to delete FAA's statement that AIA's estimate is reasonable.

17. DOT states that our quote from several manufacturers concerning a technically justified standard should be deleted because it describes modifying the rules to make them less costly, not to harmonize them. However, in response to our questions about harmonization, manufacturers emphasized that harmonization could lead to an international standard that would result in significant economic benefits if the standard were technically justified. As a result, we have not revised the report.

18. DOT states that FAA cannot delegate its responsibility to a foreign government. However, nowhere in this paragraph do we discuss or advocate such a delegation. As a result, we did not revise the report.

19. We agree with DOT that the harmonization effort is very large and involves potential changes to literally hundreds of technically complex rules. However, our statement that FAA and JAA have made little progress in

this effort for the reasons stated is accurate. The fact that the effort is so large and complicated underscores the need for a specific strategy on the part of FAA and JAA to focus their efforts. The report has been revised to include the additional information provided by DOT.

20. Our report has been revised to recognize that the harmonization effort is very large and involves potential changes to hundreds of technically complex rules. DOT's suggested appendix is included in DOT's comments earlier in this appendix.

21. We agree with DOT that FAA and JAA have made limited progress in harmonizing their certification requirements. However, the statement in the report refers both to duplication and differences, and therefore no revision is needed.

22. DOT states that some significant harmonization regulations are in the final stages of development. We are encouraged by this updated information. However, given the length of time it takes FAA to review and finalize a regulation and the changes that can occur during this process, we have not revised this report to note these as definitive harmonization accomplishments.

23. The report has been revised to reflect the suggested revision to the statement attributed to FAA officials. However, we reiterate our concern about DOT's comment that the $1-billion savings estimate is overstated in light of the fact that DOT used this same estimate to emphasize the importance of the harmonization effort in its report to the President (see comment 16).

24. FAA's method of funding differs from the European system in that FAA does not charge the manufacturer directly for certification activities (e.g., staff hours, travel expenses). Representatives from foreign and domestic manufacturers, as well as FAA and European officials we interviewed, cited this as a major difference between U.S. and European certification systems.

25. DOT's suggested revision provides the same information as provided in the draft report and duplicates information provided earlier in this section (see comment 24). As a result, we did not revise this section of the report.

26. JAA, Boeing, Douglas, Airbus, Fokker, British Aerospace, European Association of Aerospace Manufacturers, and AIA, as well as many FAA

officials we interviewed, stated that U.S. aircraft manufacturers' participation in the development of new FAA regulations is very limited in comparison to European manufacturers' participation in JAA's rulemaking. These statements still appear to us to be valid. DOT's strong disagreement with this sentence has been recognized in the report. We agree, however, that the new ARAC structure should provide a vehicle to increase industry participation earlier in the U.S. rulemaking process.

27. During the formal rulemaking process, FAA teams charged with developing new regulations consist solely of FAA officials. The report has been revised to reflect that industry can and does provide input to FAA during the preliminary phases leading to the development of regulations. Such limited input, however, is very different from JAA's system, in which manufacturing representatives comprise the majority of members on several technical study groups that propose and draft regulations. As DOT has stated, FAA implemented ARAC in part to respond to industry concerns about such differences between JAA and FAA.

28. Several FAA officials, as well as representatives from Boeing, Douglas, and AIA, stated that the development of new regulations often takes on an adversarial tone between FAA and the manufacturers. We have accurately reported and attributed these statements. However, the report has been revised to include DOT's disagreement with the characterization of the rulemaking process as adversarial.

29. FAA and JAA officials, as well as domestic and foreign manufacturers, stated that the time it takes FAA to issue a regulation could have a negative impact on the harmonization process. In response to our request for examples of this negative impact, FAA's Director, Aircraft Certification Service, JAA's former Executive Board Chairman, and JAA's Regulation Director each provided this example in separate interviews. Each complained that FAA's version of the "harmonized" regulation was in the regulatory review process, while JAA was ready to implement its version. We believe that we have accurately presented and appropriately attributed this information. As a result, we have made no revision to this report.

30. Foreign and domestic manufacturers told us that FAA often issues guidance material—known as issue papers—that contain new requirements. According to these manufacturers, FAA uses issue papers to impose new requirements because its rulemaking process would take too long to implement a regulation. In March 1992 the Associate Administrator for Regulation and Certification and several other FAA officials

acknowledged that issue papers sometimes contain new requirements because the necessary regulation to address a new technology is not available. We have revised the report to note DOT's official disagreement with this statement.

31. DOT noted that our statement about FAA's use of issue papers to impose new requirements could have a negative effect on harmonization was conjecture unsupported by evidence. We disagree with DOT's assertion. If FAA uses issue papers to impose new requirements and interpretations late in the certification process, that action would logically have a negative effect on the harmonization process if these requirements differed from JAA's. Such a statement is not conjecture but the testimony of the representatives of both foreign and domestic aircraft manufacturers we interviewed. The report has been revised to clarify the source of this statement.

32. DOT suggests a revision to a sentence attributed to foreign authorities and manufacturers as well as domestic manufacturers—not FAA officials. Since FAA officials were not present at our interviews with these representatives, we believe that such a revision would be inappropriate.

33. The report has been revised, where appropriate, to reflect DOT's suggested language. Throughout the report we use the terms "aircraft" and "airplane" interchangeably. In the draft report provided to DOT, we clearly stated that the scope of our review was limited to transport category designs. Thus, whether we use the term "aircraft" or "airplane," we are referring to those designs certified as complying with FAR 25.

Major Contributors to This Report

Resources, Community, and Economic Development Division, Washington, D.C.

John H. Anderson, Jr., Associate Director
Mary Ann Kruslicky, Assistant Director
Timothy F. Hannegan, Evaluator-in-Charge

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