

GAO

Testimony

For Release  
on Delivery  
Expected at  
10:00 a.m. EDT  
Wednesday  
May 23, 1990

Observations on H.R. 3774, "The Aging  
Aircraft Safety Act of 1989"

Statement for the Record of  
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Before the  
Subcommittee on Aviation  
Committee on Public Works  
and Transportation  
House of Representatives



Mr. Chairman and Members of the Subcommittee:

We appreciate the opportunity to testify on H.R. 3774, "The Aging Aircraft Safety Act of 1989." The purpose of the bill is to reduce the safety risk of older aircraft and thus raise the public's confidence in the overall safety of the U.S. air transport fleet. Our observations today are based on a significant body of work that we have underway in the areas of aging aircraft, aircraft maintenance, and FAA (Federal Aviation Administration) oversight of that maintenance. We testified before your Subcommittee in October of last year that FAA needed an overall plan for coordinating activities in the aging aircraft area.<sup>1</sup> The Department of Transportation recently informed us that FAA is developing such a plan and we will be interested in reviewing the specifics of that plan.

Among other actions, H.R. 3774 would require that, within 1 year of reaching a predetermined age based on usage or the passage of time, each aircraft in the U.S. fleet be removed from service so that (1) FAA can review the aircraft's maintenance documentation to determine whether the aircraft is safe to continue service, (2) FAA can conduct a direct, on-site inspection of the aircraft, and (3) the aircraft operator can demonstrate to FAA that maintenance has been adequate and timely enough to ensure the highest degree of safety. If these three actions are accomplished successfully, FAA would allow the aircraft to continue to be used for air transportation for a period of time which is not specified in the bill. Thus, the bill is designed to provide a high degree of assurance that older aircraft remain airworthy.

While we agree that this assurance needs to exist, we believe that several practical obstacles will handicap successful

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<sup>1</sup>Aging Aircraft: FAA Needs Comprehensive Plan to Coordinate Government and Industry Actions (GAO/RCED-90-75, Dec. 22, 1989).

implementation of the legislation. For example, our work suggests that, because of the following scenarios, implementing the bill would either be economically frustrating or have other unintentional effects on FAA's inspection programs:

- Enormous pressure would be placed on FAA's inspector work force over a relatively short time period. To inspect within 1 year the 1,400 aircraft that now qualify based on age, our work shows that FAA may have to dedicate almost three quarters of its airworthiness inspectors. This would severely constrain FAA's ability to effectively oversee its routine airline maintenance activities that are unrelated to aging aircraft.
  
- In addition, we foresee a virtual inundation of the aircraft repair and maintenance industry with demand for services. Our preliminary analysis of this industry shows that during the near term the industrial capacity will not exist to accommodate the added demand on repair facilities that this bill would create.

These concerns notwithstanding, we believe that, with some modifications, the bill's goal of lowering the safety risk of older aircraft can be achieved with the resources available and without unduly affecting flight schedules, airfares, or other necessary routine fleet maintenance. In our statement, we propose and discuss three alternatives to the bill, including integrating the bill's requirements into other recent regulations for additional maintenance of the aging fleet, targeting a sample of the fleet for inspection, and inspecting a random sample of the fleet. We also suggest that FAA will need to work closely with industry in developing mechanisms that will enable FAA to stretch its resources over a broader area and target them as necessary at high-risk conditions.

H.R. 3774 CALLS FOR CLOSER SCRUTINY  
OF EACH AGING AIRCRAFT

Many in the aviation community, including FAA and airline representatives, do not agree with the proposals outlined in H.R. 3774. In their opinion, this proposal implies that current airline maintenance practices under Part 121 of the Federal Air Regulations, coupled with existing FAA inspection oversight and enforcement policy, are not enough to assure the American public that each aircraft that has exceeded its economic design life is safe enough to continue flying. While no one would say that airline maintenance and federal inspection oversight are inadequate, the facts discussed below tend to undermine the confidence that can be placed in this system for assuring aircraft safety.

- A few air tragedies, some involving older aircraft, in recent years have been attributed to inadequate maintenance and inspection oversight. For example, as brought out in this Subcommittee's hearings in September 1989, the National Transportation Safety Board attributed the 1988 Aloha Airlines incident primarily to the airline's failure to detect fuselage skin and structure defects on a 19-year-old aircraft, FAA's failure to require certain inspections proposed by the plane's manufacturer, and lack of action by FAA or the manufacturer to correct structural problems that were discovered early in the aircraft's production.
  
- It is becoming more widely known that the nation's aging air transport fleet is an increasingly larger portion of the whole. Over 1,400 of the nation's 4,100-plane fleet have exceeded their economic design lives in terms of years-in-service and over 450 in terms of flight cycles (take-offs and landings). In fact, very few turbo-jet aircraft have ever been retired, and most will probably

see many more years of service. (See appendix I for additional information on the aging fleet.)

- Little is known about the status of the older aircraft in the fleet because FAA does not keep records of individual aircraft by owner/operator, age, structural problems, or compliance with specific air safety regulations. This means that (1) unless an aircraft has recently undergone a comprehensive maintenance overhaul and (2) FAA inspectors were either present during the overhaul or reviewed its documentation, FAA cannot attest to the air safety status of a specific aircraft at any given time. This is one of the circumstances that H.R. 3774 is trying to correct.

INDUSTRY MAINTENANCE PRACTICES AND FAA OVERSIGHT  
DO NOT ASSURE INTEGRITY OF AGING FLEET

Our work in the areas of aircraft maintenance and FAA's oversight of this activity shows that a more structured approach may be needed to assure the integrity of the aging fleet. For example, we believe that each of the following factors could mitigate against the kind of high quality aircraft maintenance that the public expects:

- Maintenance of even the same model aircraft is airline specific and can vary significantly across airlines. Moreover, aircraft often move frequently among airlines or from one lease arrangement to another and, therefore, are subject to a variety of maintenance practices, some of lower quality than others.
- A significant segment of our fleet is always being operated and maintained out of the country where FAA has no official cognizance or jurisdiction.

-- Finally, FAA, the agency charged with overseeing airline maintenance, has had difficulty maintaining a sufficient inspector work force, training its inspectors to handle new problems such as corrosion, and adequately ensuring compliance with its regulations for maintaining airworthiness.

These factors are discussed in more detail below.

Closer Scrutiny Would Identify Variations  
in Maintenance Quality

Aircraft manufacturers and FAA have long known that not all aircraft maintenance is equal and that some maintenance can fall below the standard called for in the regulations. FAA was concerned with the aging fleet long before the Aloha incident. In May 1981, FAA issued Advisory Circular 91-56, which provided guidance to ensure the safe operation of older aircraft and kicked off manufacturers' aging-fleet surveys. Based on these surveys of older aircraft, manufacturers have learned that maintenance varies significantly from operator to operator and that corrosion is a more serious problem than fatigue. In describing their findings to us, Boeing officials said that not all operators' maintenance programs are equivalent. Moreover, the National Transportation Safety Board has documented poor maintenance practices--notably in its investigation of the Aloha 737 and two other similar aircraft belonging to Aloha. Because other cases of improper airline maintenance or inadequate FAA oversight of its maintenance regulations have occurred, a closer look at our aging fleet could identify and correct these problems, thus providing maximum assurance of the fleet's safety.

Complicating the variation-in-maintenance issue is the widespread practice for banks, trust companies, and equipment leasing companies to buy new and used aircraft and lease them back

to various U.S. and foreign operators. Under lease arrangements, some aircraft move frequently among operators and therefore are subject many different maintenance programs. As of March 1, 1990, 51 percent of the 4,125-aircraft U.S. fleet was leased. (See appendix II.) However, a leasing company does not always plan to own a plane over its whole lifetime. Two such aircraft and their various operators are shown in appendixes III and IV. Over a period of 9 years, 11 different operators were responsible for the maintenance of one of these planes. These operators, while not operating their aircraft unsafely, may not have as much economic incentive to perform the kind of high quality and costly maintenance that would extend the aircraft's life as might aircraft operators who own their planes. And the actual owners--the lessors--of the aircraft are often financial institutions that are not in close contact with the aircraft and its maintenance. Therefore, the quality and level of maintenance performed on aircraft that move frequently among operators, lessors, and other owners could be lower than that for operator-owned aircraft.

Foreign Owned, Operated, and/or Maintained  
Aircraft Pose Special Problem

Especially relevant to the merits of H.R. 3774 are the approximately 139 U.S. registered aircraft, or about 4 percent of the fleet, that are flown over foreign routes--with some U.S. points of arrival and departure--and maintained by foreign operators. These aircraft are required to be operated and maintained under federal aviation regulations enforceable by FAA; but because the aircraft are out of the country most of the time, FAA does not have a great deal of access to them. When the lease arrangement or ownership of one of these aircraft changes and it begins operation in the U.S., a requirement exists for the aircraft to be inspected to ensure compliance with FAA regulations. However, a special problem is presented at this point because no data base exists that FAA can turn to for the maintenance status--

including compliance with air safety regulations, aircraft age, ownership, and schedule of planned mandatory repairs--of a specific aircraft that is identified by tail or serial number. This is further support for establishing an air safety inspection process for older aircraft during which the current operator can demonstrate that the aircraft has been properly maintained throughout its life and continues to be airworthy.

FAA's Shortage of Qualified Personnel Makes Adequate Inspection Difficult

FAA has had longstanding problems in recruiting and retaining aircraft safety inspectors. Although the agency's goal is to have 3,100 inspectors on board by the end of 1991, as of April 1, 1990, FAA had only 2,128. Only about 930 are assigned to oversee the maintenance programs of the major airlines, and only about half of this number have a specialty in structural airworthiness. Furthermore, FAA's current inspector staffing did not allow for (1) the recent emphasis to perform more direct inspection of aircraft instead of relying on reviews of maintenance documentation, (2) growth in the size of the commercial fleet, or (3) an emerging need for oversight of an expanding domestic and foreign repair station industry. Also, developing courses for special airworthiness hazards, such as corrosion, has been stalled at the FAA Academy for lack of personnel.<sup>2</sup> Finally, we reported recently that FAA's oversight of its airworthiness directive program is inadequate to determine whether airlines are complying with the directives<sup>3</sup> and

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<sup>2</sup>Aviation Training: FAA Aviation Safety Inspectors Are Not Receiving Needed Training (GAO/RCED-89-168, Sept. 14, 1989).

<sup>3</sup>Aviation Safety: Management Improvement Needed in FAA's Airworthiness Directive Program (GAO/RCED-90-94, Feb. 16, 1990).



that its inspection management system needs attention from FAA management.<sup>4</sup>

#### IMPACT OF H.R. 3774 ON FAA AND THE AVIATION INDUSTRY

If passed, H.R. 3774 should have a positive impact on one of FAA's major goals--ensuring the safety of air travel. And, no doubt, requiring inspection of each aircraft's airworthiness before it exceeds its economic design life would add substantially to the safety of the aged fleet. However, there would, of course, be costs associated with this additional assurance. Record checks and aircraft inspections are time-consuming tasks, and airline officials have told us that every day an aircraft is out of service costs an airline \$25,000 to \$30,000. Such out-of-service opportunity costs will cause financial strain to all airlines affected and could be catastrophic to small airlines that cannot afford to ground their aircraft for extended periods. Thus, inspecting aging aircraft will pose a familiar dilemma to FAA: balancing air safety against the economic impact of such safety on the aviation industry.

In addition, taking actions to maximize safety could create more workload than can be accomplished with existing resources. The two kinds of resources that will be in short supply are FAA inspectors and repair facilities that can inspect and work on large transport aircraft. We have some options, however, for the Subcommittee's consideration that we believe would accomplish the bill's goals but would be less resource intensive.

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<sup>4</sup>Aviation Safety: FAA's Inspection Management System Lacks Oversight (GAO/RCED-90-36, Nov. 13, 1989).

Insufficient Number of FAA  
Airworthiness Inspectors

Section 2 of H.R. 3774 would require FAA not only to review the maintenance paperwork of all aircraft exceeding their economic design life, but also to perform a direct structural inspection of that portion of the fleet. FAA estimates that this airworthiness audit would take a team of six inspectors a minimum of 2 weeks to thoroughly review paperwork and inspect the aircraft's structural integrity. Given that about 1,400 of the over 4,100 aircraft in the U.S. fleet have currently exceeded 20 years in service, the immediate task of inspecting these aircraft within the 1-year period specified in the bill is very time-consuming and labor-intensive. Moreover, every year more and more of the fleet will exceed its economic design life and qualify for inspection.

Assuming that an age criterion is used rather than the number of flights or flight hours, we estimate the immediate impact that this task would have on FAA inspector workload is as follows: Teams of 6 inspectors (including inspectors with structural expertise) working 2 weeks each on 1,400 aircraft would require about 350 staff-years, or 350 people working for 1 full year. FAA currently has a total of a little over 2,100 inspectors, approximately 930 of whom are assigned to oversee maintenance programs of Part 121 scheduled air carriers. Of the 930, about 493 are airworthiness inspectors. This means that almost three quarters (350 out of 493) of FAA's qualified inspector work force would be required to accomplish the bill's objectives. With this many inspectors focused on a single task, FAA may be hard-pressed to effectively accomplish its other safety compliance tasks. These tasks include overseeing airline maintenance on a daily basis; approving changes to airline maintenance programs, modifications to aircraft, and changes to fleet composition; evaluating airline maintenance training programs; and performing enroute, ramp, and facility inspections.

Inadequate Repair Station Capacity to  
Accommodate Repair Work

In addition to the added pressure that the bill would put on the inspector work force, H.R. 3774 would create severe scheduling problems for the repair station industry. This is because proper inspection of an aircraft should be done while the aircraft is completely enclosed inside a permanent structure, out of the weather and wind. The number of such structures that can be used for this purpose, however, is limited.

On the basis of our observations and discussions with officials U.S repair stations--both independent and airline owned--we have identified about 50 repair stations in the U.S. that can physically accommodate large transport aircraft and that have the capability to maintain these aircraft. While some of these stations are owned by major U.S. airlines and have several large hangars that can completely accommodate a dozen or more aircraft, others are smaller independent facilities that can enclose only a few aircraft at one time. To provide a rough estimate of the industry's ability to respond to the bill's requirements, we asked a sample of both airline and independent repair stations what portion of their capacity was projected to be used in 1990. Overall, the five airlines and four independent repair stations that we surveyed reported operating at or near 100 percent of capacity. One independent repair station even turned away more aircraft than it worked on in 1989. Moreover, these repair station officials told us that because of skilled labor and space shortages, the industry cannot expand in the near term to meet any significant increase in demand.

Therefore, to respond to H.R. 3774's requirements for inspecting older aircraft, the airline industry would have to displace or postpone a large amount of scheduled repair and maintenance. This could mean grounding some aircraft, raising

airline costs, and eventually affecting airfares and reducing flight service.

OPTIONS TO THE APPROACH OUTLINED IN H.R. 3774

Recognizing the practical obstacles to full implementation of H.R. 3774, we have identified three options that lessen the impact on inspector and repair station resources by either reducing the number of aircraft to be inspected or extending the time period for accomplishing this task. Below we describe the three options; however, others or combinations of these also could be developed.

- The 100 percent inspection requirement of the bill could be retained, but the inspections could be performed in conjunction with airlines' schedules for accomplishing repair work specified in a number of new air safety regulations recently issued by FAA. These proposed regulations address problems associated with aging aircraft, and FAA has given the airlines 4 years to comply. Combining the new regulations with the proposed inspections would spread out over 4 years the initial wave of 450 to 1,400 aircraft that have currently surpassed their economic design lives. (And over the 4-year period, more aircraft will be added to the first 1,400.) This alternative has the advantage of having a less severe impact on both FAA's inspection resources and the repair industry than the H.R. 3774 approach. This option would tend to promote air commerce (lessen the cost impact on operators) more than H.R. 3774 because it would spread the inspections out over a longer time period. The safety risk for the fleet due to inspecting some aircraft toward the end of the 4-year period could be lessened by scheduling the oldest aircraft first.

-- A random sample of each airline's fleet could be taken with the objective of evaluating the remainder of the airline's fleet based on the inspection results of the sample. Additional samples could be taken depending on the results of the evaluation. This sampling approach, coupled with testing of representative aircraft bodies to determine the time period over which the inspection would be valid, is an alternative that FAA says would accommodate their resources. While it, too, would be more practical than the 100 percent inspection options and would take fewer aircraft out of service, results of inspecting a sample could not be projected across an entire fleet without taking a fairly large sample. Moreover, this option would not raise assurance of safety on a plane by plane basis as much as the 100 percent inspection options, and its implementation would be complicated by the movement of aircraft in and out of an airline's fleet.

-- A "targeted" sample of aircraft could be selected from the U.S. fleet reflecting the quality of airline maintenance programs. Sampling criteria could be based, for example, on the results of manufacturers' aging-fleet surveys, FAA's ongoing inspection team visits to airlines, the amounts of civil penalties that FAA assessed airlines for violations, and other indications of maintenance program quality. Depending on the results of inspecting the sample, other samples could continue to be taken and maintenance programs and practices could be altered or the status quo retained as appropriate. This option would not ensure as high a degree of safety on a plane by plane basis, but it is more practical than the 100 percent inspection option in terms of resource use. It also is sensitive to airlines' need to keep their aircraft in service. Moreover, this option is in line with a recommendation we made in our management review of the Department of Transportation in which we said

that FAA should use safety data to target its inspector resources at high-risk conditions.<sup>5</sup>

Regardless of which of these or other options the Subcommittee may wish to consider and eventually implement, FAA will need to make many decisions about how it will use its inspector resources. While aircraft inspection and structural expertise exists in the private sector that can supplement FAA staff, taking advantage of it will require advance planning and coordination. For example, FAA is exploring the concept of a "self-audit" capability that would exist within an airline that already has a qualified quality assurance organization. While this is an emerging issue and FAA has only within the last year begun to explore its application to aircraft maintenance and inspection activities, it is highly relevant in the context of H.R. 3774 because of the impact that bill could have on FAA inspector resources.

Aircraft operators also will need to plan ahead. It will be imperative for each operator to forecast how this legislation will apply to his fleet and make early plans for scheduling the inspections within the repair industry's capacity to provide the services.

In short, achieving the bill's goals will not be easy. It will require some sacrifices and much coordination on the parts of many members of the aviation community. To better ensure that this happens and regardless of which approach the Committee chooses to implement the legislation, the Committee may wish to consider adding to Section 2 (6) of the bill the requirements that FAA

-- track maintenance status and other information using a tail

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<sup>5</sup>See Department of Transportation: Enhancing Policy and Program Effectiveness Through Improved Management (GAO/RCED-87-3, Apr. 13, 1987).

or serial number-based system and thus provide a basis for choosing which aircraft to inspect first and

- establish a plan for working with operators and manufacturers for the purposes of augmenting FAA staff resources and scheduling aircraft through the inspection process.

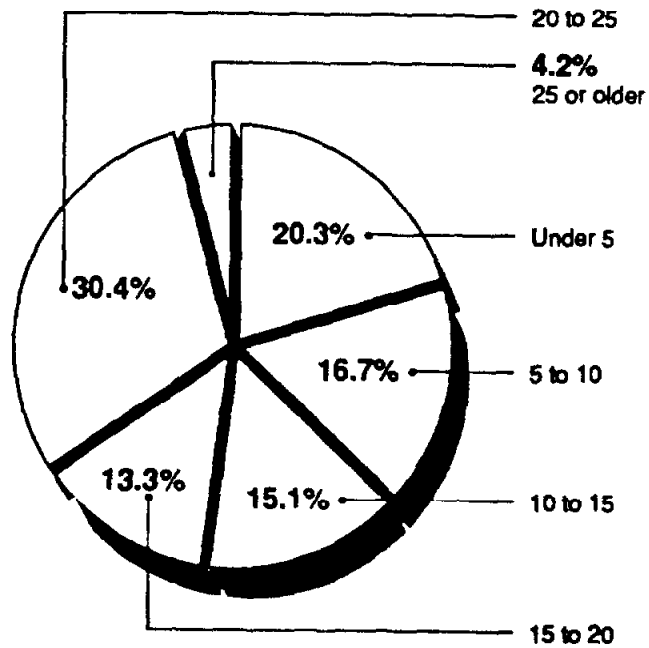
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In summary, we agree that if an older aircraft is to remain in commercial service, a hard look must be taken at its maintenance record and at the plane's structural integrity. FAA, however, will not be able to do this alone; it will need the resources and support of the manufacturers and major air carriers. Moreover, achieving the bill's goals in a single year could exceed the repair industry's capacity to effectively provide such services. Instead, focusing first on the oldest or most used aircraft in an orderly, scheduled fashion would minimize disruption of the air travel industry. At the same time, this will have a positive impact on reducing the risk of an air tragedy due to structural fatigue or corrosion.

Mr. Chairman, this concludes our statement. We would be pleased to answer questions that you or other Subcommittee Members may have.

Profile of Aging Commercial Jet Transport Fleet

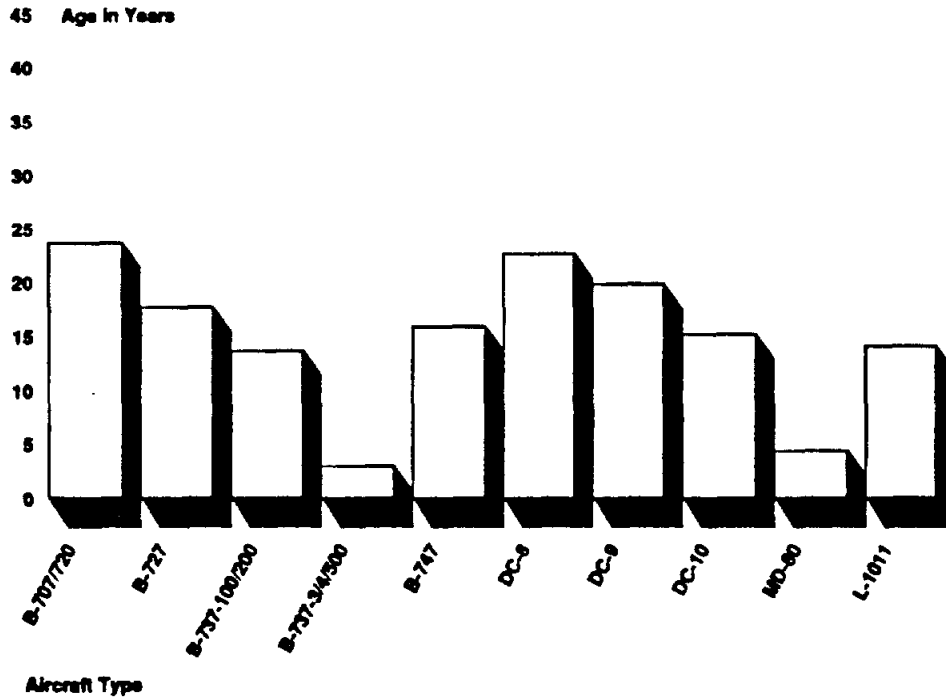
Figure I.1: Age Distribution of U.S. Fleet  
(As of March 1990)



Source: Aviation Data Service

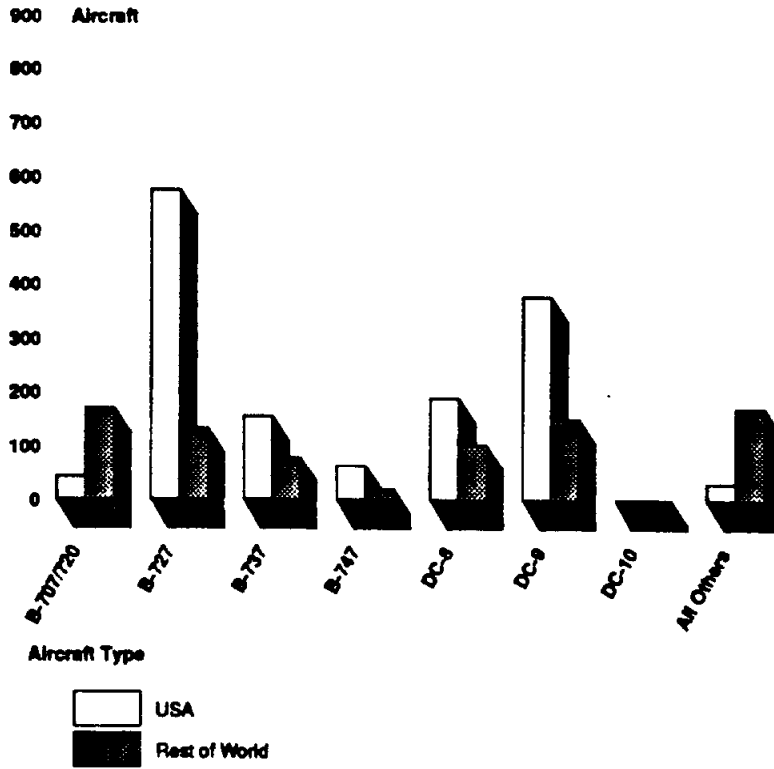


Figure I.2: Average Age of U.S. Manufactured Aircraft  
in the U.S. Fleet  
(As of March 1990)



Source: Aviation Data Service

Figure I.3: Aircraft 20 Years Or Older:  
U.S. vs Rest of the World  
(As of March 1990)



Source: Aviation Data Service

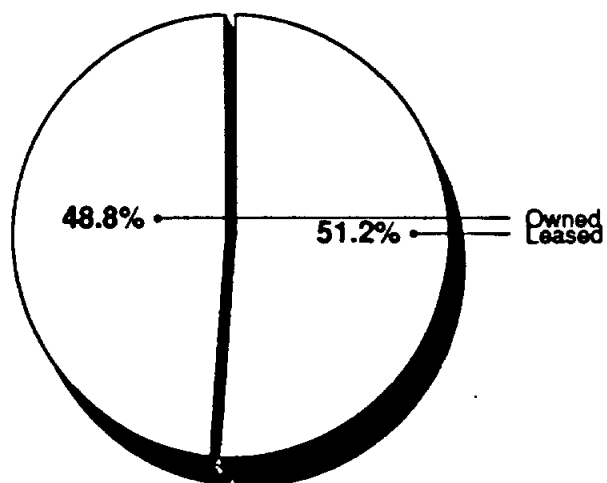
Table I.1: U.S. Manufactured Aircraft That Exceed  
Design Life in Cycles  
(As of March 1990)

<u>Aircraft Type</u>		<u>Design life cycles</u>	<u>Number exceeding design life in cycles</u>	
			<u>USA</u>	<u>Rest of World</u>
Boeing	707/720	20,000	15	117
	727	60,000	8	6
	737	75,000	2	0
	747	20,000	1	18
Douglas	DC-8	25,000	35	17
	DC-9	40,000	407	212
	DC-10	42,000	0	0
<b>Total</b>			----- 468 =====	----- 370 =====

Source: Aviation Data Service

Information on Leased Aircraft in the U.S. Fleet

Figure II.1: Leased and Owned Aircraft in U.S. Fleet  
(As of March 1990)



Source: Aviation Data Service

Table II.1: Leased Aircraft By Aircraft  
Type in The U.S. Fleet  
(As of March 1990)

<u>Aircraft Type</u>		<u>Owned</u>	<u>Leased</u>	<u>Total</u>	<u>Percent Leased</u>
Boeing	707/720	23	20	43	46.5 %
	727	666	531	1197	44.4
	737-100/200	177	236	413	57.1
	737-3/4/500	120	252	372	67.7
	747	93	89	182	48.9
	757	67	89	156	57.1
	767	47	64	111	57.7
Douglas	DC-8	118	82	200	41.0
	DC-9	280	241	521	46.3
	DC-10	117	68	185	36.8
	MD-80	159	248	407	60.9
Lockheed	L-1011	52	54	106	50.9
All Others		96	136	232	58.6
Total		2015	2110	4125	51.2 %

Source: Aviation Data Service

History of Select Leased Aircraft

Table III.1: Leasing History of a Late Model  
Boeing 737 (Serial Number 22453)  
 (As of March 1990)

<u>Operator</u>	<u>Timeframe</u>	<u>Country of Operation</u>
Air Belgium	3/81 to 3/81	Belgium
Bahamasair	3/81 to 4/81	Bahamas
Air Belgium	4/81 to 4/81	Belgium
Eagle Air	4/81 to 4/81	Iceland
Britannia	4/81 to 11/81	United Kingdom
Eagle Air	11/81 to 11/81	Iceland
Air Belgium	11/81 to 10/82	Belgium
Orion Airways	10/82 to 10/82	United Kingdom
Air Belgium	10/82 to 3/83	Belgium
Wien Air Alaska	10/83 to 4/84	United States
Orion Airways	4/84 to 11/84	United Kingdom
IFLC	11/84 to 12/84	United States
America West	12/84 to 4/88	United States
Amberair	4/88 to 10/88	United Kingdom
Paramount Airways	10/88 to 11/88	United Kingdom
Dragonair	11/88 to 4/89	Hong Kong
Paramount Airways	4/89 to 10/89	United Kingdom
Dragonair	10/89 to present	Hong Kong

Source: Aviation Data Service

Table III.2: Leasing History of A Late Model  
Boeing 727 (Serial Number 21349)  
 (As of March 1990)

<u>Operator</u>	<u>Timeframe</u>	<u>Country of Operation</u>
Singapore Airlines	10/77 to 6/80	Singapore
Dan-Air London	6/80 to 11/81	United Kingdom
LACSA	11/81 to 4/82	Costa Rica
Dan-Air London	4/82 to 10/82	United Kingdom
LACSA	10/82 to 4/83	Costa Rica
Dan-Air London	4/83 to 10/83	United Kingdom
LACSA	10/83 to 4/84	Costa Rica
Dan-Air London	4/84 to 1/85	United Kingdom
Sun Country Airline	1/85 to 4/85	United States
Dan-Air London	4/85 to 12/85	United Kingdom
Sun Country Airline	12/85 to 4/86	United States
Dan-Air London	4/86 to 1/87	United Kingdom
Sun Country Airline	1/87 to 4/87	United States
Dan-Air London	4/87 to 12/87	United Kingdom
Sun Country Airline	12/87 to 4/88	United States
Dan-Air London	4/88 to 12/88	United Kingdom
Sun Country Airline	12/88 to 4/89	United States
Dan-Air London	4/89 to 12/89	United Kingdom
Sun Country Airline	12/89 to present	United States

Source: Aviation Data Service

Information on U.S. Aircraft Operating Overseas

Table IV.1: U.S. Registered Aircraft Operated Overseas by Aircraft Type and Location  
(As of March 1990)

<u>Aircraft Type</u>	<u>Number</u>	<u>Location</u>
Airbus A-300	2	Venezuela
Boeing 707/720	9	Netherlands, Uruguay, Guyana, Peru, United Kingdom, Antigua, Dominican Republic
727	27	Columbia, Peru, Venezuela, Brazil, Costa Rica, Mexico, Bahamas
737	20	Zaire, El Salvador, Greece, Australia, Norway, West Germany, Guatemala
747	33	Uk, New Zealand, Philippines, Netherlands, Lebanon, France, Japan, Switzerland, Singapore, Taiwan
757	1	West Germany
767	2	El Salvador, Columbia
Douglas DC-8	6	Liberia, Costa Rica, Zambia Dominican Republic, Surinam
DC-9	3	Mexico, Guatemala
DC-10	15	Mexico, France, Zambia, Nigeria, Finland, Malaysia, Indonesia
MD-80	13	Argentina, Mexico, Netherlands Antilles
Lockheed L-1011	6	Egypt, Ivory Coast, Bahrain, Trinidad
Others	2	South Africa
Total	139	

Source: Aviation Data Service



Table IV.2: U.S. Registered Aircraft That Have Been  
Operated Overseas by Aircraft Type  
 (As of March 1990)

<u>Aircraft type</u>	<u>Fleet size</u>	<u>Number operated overseas</u>	<u>Percent operated overseas</u>
Airbus			
A300	67	2	2.9 %
A310	19	0	<
A320	6	0	<
Boeing			
707/720	43	37	86.0
727	1,197	142	11.9
737	785	91	11.6
747	182	21	11.5
757	156	2	1.3
767	111	2	1.8
Douglas			
DC-8	200	134	67.0
DC-9	521	146	28.0
MD-80	407	8	2.0
DC-10	185	36	19.5
Lockheed L-1011	106	7	6.6
All others	<u>140</u>	<u>26</u>	<u>18.6</u>
Total	<u>4,125</u>	<u>654</u>	15.9

Source: Aviation Data Service