

GAO

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

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AIRCRAFT MAINTENANCE

FAA Needs to Follow Through on Plans to Ensure the Safety of Aging Aircraft



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The Honorable James L. Oberstar
Chairman
The Honorable William F. Clinger, Jr.
Ranking Minority Member
Subcommittee on Aviation
Committee on Public Works and Transportation
House of Representatives

More than 1,800 planes used by the nation's air carriers have exceeded their economic design life either in terms of years of service—20 years—or in terms of flight cycles (number of take-offs and landings). To ensure the continued safety of these aircraft, the Federal Aviation Administration (FAA) issued rules in 1990 requiring airlines to substantially modify the aircraft. We reported in May 1991 that, for efficiency reasons, several major airlines planned to modify their aging fleets before initial compliance deadlines.¹ Since then, the demand for air travel has diminished significantly, which has left the airlines with excess seating capacity. Excess capacity, in turn, has created uncertainty in airlines' plans to keep their older and generally most costly aircraft.

Uncertainty in airlines' decisions to continue operating their aging fleets has focused attention on the safety of aging aircraft. The Aloha Airlines accident in 1988—in which part of the fuselage ripped apart during flight—illustrated a breakdown in operator, manufacturer, and FAA maintenance oversight. It also clearly established the need for effective monitoring to detect corrosion and structural fatigue before these conditions seriously affect the safety of an aircraft. Therefore, as agreed with your offices, this report assesses FAA's response to recommendations in our earlier report to improve FAA's monitoring of airlines' compliance with recent rules for aging aircraft. We examined (1) airlines' changing maintenance strategies for their aging aircraft, (2) FAA's efforts to monitor airlines' compliance with its recent rules for aging aircraft through a centralized data base, and (3) the effectiveness of FAA's inspection initiatives to monitor the aging aircraft fleet.

Results in Brief

In light of huge financial losses in the airline industry in recent years, airlines' strategies for keeping their aging aircraft have changed since our

¹Aircraft Maintenance: Additional FAA Oversight Needed of Aging Aircraft Repairs (GAO/RCED-91-91A, May 24, 1991).

1991 report. Prior to 1991, many airlines planned to increase their seating capacity by continuing to fly their aging aircraft and, in many cases, purchasing new aircraft as well. Recently, because of changing demands for air travel and corporate financial conditions, many airlines' operating plans are in a state of flux. Airlines are frequently revising their estimated capacity needs, including plans to keep aging aircraft.

Because of these changing conditions and to improve its oversight of aging aircraft, FAA planned to develop a centralized aircraft data base and direct inspectors to provide more focused oversight of these aircraft. FAA has not made much progress in developing a centralized aircraft data base. Instead of a data base that could be periodically updated with current and specific information on an aging aircraft's status, FAA captured only aggregate data on the compliance status of the aging U.S. fleet as of September 1992. FAA's summary report does not contain compliance information on specific airlines or aircraft. Without such a data base, FAA headquarters cannot identify aircraft that are rapidly approaching compliance thresholds and target its inspection resources to focus on those aircraft or airlines. FAA's plans to obtain data to update the summary report remain uncertain.

The effectiveness of FAA's inspection initiatives to monitor the aging aircraft fleet is questionable. FAA directed its inspectors to emphasize aging aircraft inspections; however, these inspections represent only one of several inspection activities that FAA directs inspectors to emphasize. Because little specific guidance exists, inspectors often use their judgment to decide which items of emphasis would best complement their oversight activities; this judgment does not always coincide with FAA headquarters' intended inspection coverage for aging aircraft. Moreover, because FAA's automated inspector tracking system does not have complete data, FAA headquarters cannot effectively (1) determine whether inspectors are emphasizing aging aircraft-related inspections as directed and (2) target resources to high-priority areas.

Background

After the Aloha accident, the National Transportation Safety Board expressed concern that FAA relied too much on airline maintenance records to verify airlines' compliance with FAA rules. In its report on the Aloha accident, the Board found that FAA was "not effective in verifying that the airplanes were maintained in a safe, airworthy condition." The Board recommended that FAA place greater emphasis on evaluating the actual condition of each aircraft.

In concert with the Board, FAA and the aviation industry recognized that the system of ensuring the structural integrity of aging aircraft relied too heavily on periodic airframe inspections. Instead of this approach, the industry agreed that requirements should be established to modify specific structural sections of aircraft that had a history of sustaining structural fatigue or corrosion.

In 1990, FAA issued multipart rules, called airworthiness directives (AD), that mandated many maintenance actions that the manufacturers had formerly recommended for aging aircraft. Some of the requirements in the rules must be completed before an aircraft reaches a certain age; others must be completed before an aircraft has flown a certain number of hours or a specific number of flights. Currently, about 1,800 aircraft have exceeded the age threshold that triggers some of the requirements in the rules. Over time, these aging aircraft ADs will affect more than 3,216 aircraft in the U.S. fleet—such as Boeing 727s and McDonnell-Douglas DC-9s—as they reach various age and use-related thresholds during their service lives. All aircraft that are at least 20 years old in 1994 must comply with at least the age-related modifications listed in the rule by mid-1994.

FAA monitors airlines' compliance with its aging aircraft ADs through its inspector work force. FAA inspections of aircraft are accomplished mainly by FAA's Principal Maintenance Inspectors (PMI). Besides the PMIs, other FAA inspectors, called geographic inspectors, perform a variety of inspection functions. Both types of inspectors perform AD verification inspections, structural inspections, and "hands-on," or intensive visual, inspections to evaluate the condition and routine servicing of the aircraft. Also, they are directed to emphasize other inspections, such as the inspection of maintenance facilities, pilot training facilities, and monitor aviation safety promotion and accident prevention activities.

Current Economic Conditions Have Changed Airlines' Maintenance Plans

Since our May 1991 report, many airlines' plans for dealing with their aging fleets have changed dramatically. Before their current economic problems, most airlines needed their aging aircraft to meet demand for air travel and planned to keep and modify them to comply with FAA's new rules. In 1990, airline officials told us that the most efficient compliance approach was to perform all the maintenance and modification work at once while an aircraft was out of service for other routine maintenance, even though deadlines for much of the work were several years away. Today, that approach has changed and airlines' plans are in a state of flux. Since 1990, financial turmoil in the airline industry has resulted in multibillion-dollar

losses by the airline industry, and many airlines are changing the composition of their fleets. Some airlines have delayed or canceled new aircraft orders and plan to use aging aircraft longer than anticipated. Others plan to replace aging aircraft with new aircraft purchases. And some plan to purchase more aging aircraft to expand their fleets.

In today's economic environment, therefore, airlines cannot say with any certainty how long they plan to keep their aging aircraft. Furthermore, many airlines have changed their fleet composition strategies numerous times to respond to changing demand. For example, one airline official told us that his airline changed its fleet composition plan 15 times over the past year because of changes in air travel demand and corporate financial conditions. Another airline that had planned in 1990 to modify and continue to fly its aging aircraft later planned, as of May 1992, to operate them until they reach the use-threshold limits specified in the AD and then retire them. Having previously retired some aging aircraft, another airline official told us that his airline recalled several aging aircraft to meet higher demand during the summer of 1992. Finally, one cargo airline official told us that his company originally planned to retire its aging aircraft, but now the company plans to continue operating them and expand its fleet by obtaining other used aircraft.

Despite Steps Taken by FAA, FAA Headquarters Has Limited Knowledge of Aging Aircraft Compliance

In our May 1991 report, we recommended that FAA obtain periodic reports on airlines' compliance with the rules for aging aircraft. While FAA did not formally concur with our recommendation, FAA officials testified before the Congress in September 1991 that the agency planned to create a data base from airline-provided information. The data base would track whether each aging aircraft in the airlines' fleets was in compliance with aging aircraft ADS. However, instead of creating a centralized aircraft data base, FAA used an independent contractor to collect and summarize data from the airlines on the compliance status of the aging U.S. aircraft fleet. Using the contractor's information, FAA issued a summary report in October 1992 that depicts the compliance status of the aging fleet—by type or model of aircraft only—as of September 1, 1992.

The usefulness of the October 1992 summary report is severely limited because it does not describe compliance with the aging aircraft ADS by individual airlines or aircraft. Hence, FAA cannot use the information in the report to identify aircraft operators that have not fully complied with the new rules. FAA's Deputy Director for Flight Standards Service told us that FAA directed the contractor to restrict all access to airlines' data in order to

address the airlines' concerns about sensitive business strategy information. Because of this restriction, FAA headquarters cannot obtain or validate a specific airline's data collected from the contractor. Without access to this information, FAA headquarters cannot identify those aircraft or airlines that have yet to achieve compliance with the new rules. With the information, however, FAA could direct its inspectors to (1) monitor those airlines that might be slow in complying, (2) request their plans for compliance, and (3) identify potential obstacles—such as parts or labor shortages—that these airlines might be facing. In this way, FAA could better ensure that all aircraft comply with the new rules as they reach the various thresholds.

Both FAA and an official from the Air Transport Association (ATA) acknowledged that one summary report will not adequately keep FAA current with the compliance status of airlines' aging aircraft fleets. Moreover, several airline officials confirmed that the data, even in summary form, would be obsolete by the time FAA published the summary report. An FAA official told us that FAA plans to continue updating the compliance status information but that FAA needs the airlines' cooperation to do so efficiently. Some airlines, however, are concerned about how FAA collects and safeguards the compliance information. They also believe that their efforts in the data collection process are overly burdensome and that the compliance information is already accessible to FAA inspectors.

In response, FAA is considering the possibility of having its own inspectors obtain and summarize airlines' compliance data and then forward the summary data to FAA headquarters officials. This approach would provide the inspectors with detailed compliance information for each aircraft in an airline's fleet and would provide detailed airline compliance data to FAA headquarters. However, some inspectors cautioned that this approach would be time-consuming without airlines' assistance and thus could detract from other oversight activities. An ATA official told us that ATA is working with the airlines and FAA to establish a reporting mechanism that would not be unduly burdensome to the airlines or to FAA.

To address the airlines' concerns about safeguarding proprietary information, FAA officials plan to define certain segments of the compliance data provided for the report as "competitive sensitive." Such data would be exempt from public disclosure under the Freedom of Information Act. FAA officials plan to work with ATA's legal counsel to secure the data from disclosure. FAA officials plan to issue an updated summary report by the fall of 1993.

Effectiveness of FAA's Inspection Initiatives to Monitor Aging Aircraft Fleet Is Questionable

To oversee the aging fleet, FAA relies mainly on three inspection activities: AD verification inspections, the National Aviation Safety Inspection Program (NASIP), and structural spot inspections. AD verifications involve FAA inspectors' review of paperwork prepared by airlines and visual examination of an aircraft to ensure that required repairs and modifications were properly documented and performed. Under NASIP, FAA inspects certain airlines, flight schools, and maintenance facilities each year and examines their operations and maintenance procedures. FAA officials told us that NASIP inspections will often focus on an entire airline to review all operations and maintenance procedures of an airline's fleet. The structural spot inspection provides an opportunity for FAA inspectors to complete hands-on, 1-day inspections of small sections of hundreds of aircraft when they are out of service and undergoing extensive maintenance. During this time, inspectors can examine specific areas on the aircraft not normally accessible to detect conditions particularly relevant for aging aircraft.

FAA cannot determine whether its inspectors are performing many of these inspections on aging aircraft because FAA's method of recording these inspection activities does not capture detailed information needed to accurately track the activities performed by the inspectors. Moreover, inspectors told us that they also had other high-priority activities and lacked guidance to determine how many aging aircraft to inspect.

FAA's Inspectors Are Not Emphasizing Aging Aircraft AD Compliance

In 1991, FAA headquarters issued guidance calling for all inspectors to place a high priority on verifying airlines' compliance with aging aircraft ADS during their AD inspections, regardless of the age of the fleet being monitored.² During our visits with 15 of FAA's PMIs, who are responsible for about 71 percent of the aging U.S. aircraft fleet, most said that they used their discretion when verifying ADS. Although all 15 PMIs monitored airlines having some aging aircraft, only 4 said that they emphasized compliance with aging aircraft ADS compared with other ADS.

The ADS that PMIs said they may choose to emphasize include those that are time critical, those that must be reviewed periodically, or those that are readily accessible. For example, one inspector emphasized repetitive ADS and told us that one such AD requires the inspector to visually check engine bolts on an aircraft and then review the airline's maintenance paperwork to determine if the bolts were inspected by airline officials

²FAA's National Work Program Guidelines (N 1800.130) outline inspectors' work priorities for fiscal year 1992.

within the time specified by the AD. The inspector said he also may choose to verify other ADS that could potentially be tampered with, such as smoke detectors.

Regardless of the type of AD inspected, FAA headquarters guidance directs inspectors to enter the AD number into FAA's Program Tracking and Reporting Subsystem (PTRS), which FAA headquarters uses to oversee inspectors' activities. However, inspectors do not consistently enter the AD number into the system. Some inspectors told us they interpreted the headquarters guidance to mean that they should enter the AD into the PTRS only when the airline did not comply with the requirements. We found that other inspectors did not enter the AD inspected into the PTRS because of administrative constraints. However, all the inspectors we spoke with agreed that such information would be necessary if FAA were to use PTRS information to identify the type of ADS that inspectors were verifying.

Because inspectors do not consistently enter AD data into the PTRS, FAA management cannot determine which ADS were verified by inspectors during any inspection year. An FAA official told us that the original intent of the PTRS was to ensure that FAA management could use the data to analyze inspectors' AD verification activities and then adjust FAA's overall work plan guidance as needed to target resources or otherwise reflect changing priorities. Without complete information, FAA cannot determine if its guidance is an effective tool in directing inspectors' oversight activities.

Limited Hands-on Inspections of Aging Aircraft Have Occurred Under NASIP

FAA officials said they added aging aircraft inspections to NASIP in 1991. FAA's guidance for the aging aircraft portion of the NASIP inspection includes a so called "nose-to-tail," or comprehensive, hands-on inspection of at least one aging aircraft in the airline's fleet per year.

Before NASIP, FAA inspected aging aircraft under its Aging Aircraft Fleet Evaluation Program, which was initiated after the Aloha accident. Under this program, FAA performed a series of in-depth visual inspections of selected aircraft operated by major airlines to gain a better understanding of the fatigue and corrosion occurring on older aircraft. Each evaluation under this program took a team of FAA inspectors about 2 weeks to complete and involved a nose-to-tail analysis of the aircraft and the airline's record-keeping system. FAA inspectors provided feedback from these evaluations to the airlines. After conducting 23 evaluations of aging aircraft over an 18-month period, FAA issued a final report on the program in January 1991. The final report concluded that FAA should develop

guidance and recommendations from the initial evaluations as well as future NASIP inspections to ensure the continued serviceability of aging aircraft. Ultimately, the report's recommendations led to the adoption of ADS addressing corrosion control and prevention and the promotion of other safety-related initiatives by FAA.

During 1991 and 1992, FAA officials told us that FAA planned seven NASIP inspections of aging aircraft, but only one included a nose-to-tail, hands-on inspection of an actual aging aircraft. For the other inspections, no aging aircraft were available. In contrast, FAA completed 23 visual inspections in 18 months under the Aging Aircraft Fleet Evaluation Program and documented each inspection. FAA officials told us that fewer aging aircraft inspections had been completed under NASIP because FAA wanted to develop specific guidance for NASIP inspections of aging aircraft to ensure consistency between inspections.

FAA officials said they hoped to correct the scheduling problem for their 1993 NASIP schedule to ensure that aging aircraft were available for visual inspections during the NASIP. For fiscal year 1993, FAA plans to conduct six aging aircraft NASIP inspections. The FAA official in charge of the NASIP program told us that aging aircraft inspections are just one of several specific emphasis areas for 1993. He said that NASIP's overall goal will be to inspect aircraft of various ages to monitor the broad spectrum of aircraft in the U.S. fleet and to inspect aircraft repair stations that perform airframe maintenance, accessory parts overhauls, and engine work. However, these activities do not specifically target aging aircraft as done in the Aging Aircraft Fleet Evaluation Program.

Oversight of Structural Spot Inspections Could Be Improved

We could not readily determine the effectiveness of the spot inspections in providing meaningful oversight of the aging aircraft fleet because the data collected by FAA's PTRS do not indicate whether an inspection was done on an aging aircraft. Moreover, FAA guidance does not direct the inspectors to monitor aging aircraft any differently from the way they monitor other types of aircraft for this kind of inspection. Also, when examining aging aircraft, inspectors do not have written guidance on the type of aging aircraft-related repair and modification work to be reviewed and recorded in the data base or on the minimum level of inspections that need to be done.

Using FAA's PTRS data base in concert with a commercial aircraft data base, we found that inspectors performed 361 structural spot inspections on

aging aircraft in fiscal year 1992. However, we were able to identify only 110 of those inspections, or inspections for about 6 percent of the 1,817 aging U.S. aircraft fleet, that were aging aircraft-related.³

Our review of data on 10 airlines, representing about 71 percent of the U.S. fleet's aging aircraft, showed that the percentages of aging aircraft that underwent structural spot inspections varied widely. For example, at one airline whose extensive maintenance is done primarily at one location, FAA inspectors conducted structural spot inspections on 59 percent of that airline's aging aircraft fleet. However, at another airline whose maintenance is done at several locations, FAA inspectors conducted similar inspections on only 4 percent of that fleet. The reasons for this wide variation in inspection coverage are unclear, but some FAA PMIS and geographic inspectors told us that resource limitations, such as the lack of travel funds or competing priorities, limited the number of inspections performed.

FAA does not currently have data to identify accurately either the number of aging aircraft-related structural spot inspections performed or the wide variations in inspection coverage as noted above. FAA's PTRS data on structural spot inspections do not indicate the age of the aircraft inspected, nor do they contain a specific means to indicate whether the inspection was aging-aircraft related. Hence, FAA does not know the extent to which structural spot inspections are being used to monitor aging aircraft.

Conclusions

The precarious financial health of the airline industry increases the likelihood for continued changes both in the mix of aircraft in airlines' fleets and in their strategies for operating aging aircraft. We believe that FAA needs to have a clear picture of airlines' progress in complying with rules for aging aircraft. Because of the gravity and potential safety ramifications of even one major incident involving an aging aircraft, we believe that FAA needs to know the compliance status of each of the 1,800 planes in the nation's aging fleet.

To its credit, FAA has taken positive steps to monitor airlines' compliance with rules for aging aircraft. However, it has not developed effective data

³We considered aging aircraft-related inspections to include reviews of repair and modification work done on aircraft to correct fatigue problems associated with aging aircraft or instances when corrosion was found during maintenance work. Of the remaining 251 inspections listed in the PTRS, 152 were conducted on aircraft whose maintenance or repairs were not unique to aging aircraft, and 99 had no description of the work reviewed.

bases on aircraft compliance or the activities of its inspectors or performed its established inspection activities of aging aircraft as planned. Better information on airlines' compliance would enable FAA to identify the areas of highest risk, which require a greater proportion of its attention. FAA could then direct its inspection resources to meet specific circumstances or other competing priorities. Because FAA's large work load disperses available inspection resources over many high-priority areas, we believe it is essential that FAA have access to complete and accurate data with which to target resources to those areas needing the most attention.

Recommendations

We recommend that the Secretary of Transportation direct the Administrator, Federal Aviation Administration, to take the following actions:

- Promptly develop, with assistance from the U.S. airline community, a means to collect detailed aging aircraft AD compliance information on a regular basis and report the status of the fleet to FAA headquarters. FAA headquarters officials would then be able to identify problem areas and target inspection resources accordingly.
- Clarify guidance directing inspectors to report complete inspection results using the PTRS, including the type of AD verified during an inspection, so that FAA management can more clearly determine which ADS its inspectors are checking.
- In scheduling NASIP inspections with an aging aircraft component, ensure that an aging aircraft is available during the review and that a hands-on, nose-to-tail examination of an aging aircraft is performed.
- Revise the guidance for the structural spot inspections so that inspectors are required to achieve a minimum level of inspections on aging aircraft undergoing some specific aging aircraft-related maintenance, repair, or modification.

Scope and Methodology

To determine the adequacy of FAA's programs to monitor compliance with ADS and other aging aircraft-related maintenance, we interviewed 15 FAA Principal Maintenance Inspectors responsible for overseeing 17 airlines, which account for about 71 percent of the aging U.S. aircraft fleet, to discuss inspection activities. We also met with FAA headquarters officials to discuss current and future FAA initiatives developed to monitor aging aircraft. To obtain the aviation industry's perspective, we spoke with officials from 17 airlines that operate about 71 percent of the aging U.S.

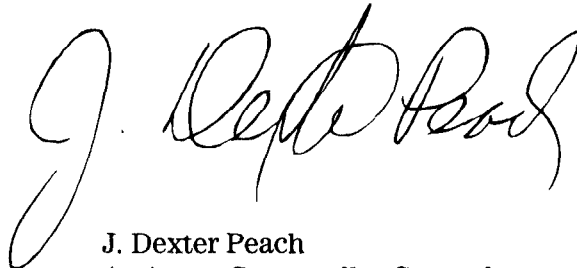
fleet and officials from ATA. We conducted our review between March and December 1992 in accordance with generally accepted government auditing standards.

Agency Comments

We discussed the facts in this report with officials at FAA, including the Deputy Director for Flight Standards Service, and officials at ATA, including the Director of Maintenance and Materiel. FAA and ATA officials generally concurred with the factual information presented in the report. FAA officials noted that current PTRS guidance could be clarified to ensure consistency among reported inspection activities and that scheduling problems associated with NASIP aging aircraft inspections must be addressed. While FAA officials said they plan to issue an updated compliance status report for aging aircraft by the fall of 1993, plans to obtain data to update the report remain uncertain. FAA officials also provided updated budget information regarding the 1993 NASIP schedule. We changed the draft to include the new information. As agreed with your office, we did not obtain written agency comments.

Unless you publicly announce its contents earlier, we plan no further distribution of this report until 15 days from the date of this letter. At that time, we will send copies to the Secretary of Transportation; the Administrator, FAA; the Director, Office of Management and Budget; and other interested parties. We will make copies available to others on request.

This work was performed under the direction of Kenneth M. Mead, Director of Transportation Issues, who can be reached on (202) 275-1000 if you or your staff have any questions. Major contributors to this report are listed in appendix I.



J. Dexter Peach
Assistant Comptroller General

Major Contributors to This Report

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

John H. Anderson, Jr., Associate Director
Eric A. Marts, Assistant Director

Seattle Regional
Office

Randall B. Williamson, Assistant Director
Steven N. Calvo, Evaluator-in-Charge
Dana E. Greenberg, Staff Evaluator
Dianne Whitman, Staff Evaluator

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