



Testimony

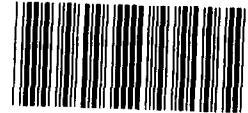
Before the Subcommittee on Aviation,
Committee on Public Works and Transportation
House of Representatives

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AVIATION SAFETY

Additional Actions Needed for
Three Safety Programs

Statement of Kenneth M. Mead,
Director, Transportation Issues
Resources, Community, and Economic Development Division



147319



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Mr. Chairman and Members of the Subcommittee:

We welcome the opportunity to appear before you to testify on three important Federal Aviation Administration (FAA) programs to improve aviation safety. These programs relate to (1) ensuring the safety of aging aircraft with new maintenance and repair requirements issued over the past 2 to 3 years; (2) reducing the risk of runway incursions through such programs as the new Airport Surface Detection Equipment (ASDE-3) radar; and (3) implementing the Traffic Alert/Collision Avoidance System (TCAS), an onboard device for alerting pilots that another aircraft is near. Our statement draws on reports and testimony we have issued over the past year, as well as ongoing work we are doing at the Subcommittee's request.

In summary, we found that FAA has made progress in the three safety programs, but additional actions need to be taken. Specifically, we found the following:

- FAA addressed the safety risk of older aircraft by issuing new requirements to structurally modify or repair such aircraft, but FAA has not completed important related actions. At hearings before this Subcommittee last year, FAA testified that it would do "all in its power" to monitor compliance with the new requirements, including establishing a data base for this purpose. To date, FAA has not completed these actions. FAA has not established the planned data base but intends to issue a once-only report to the Congress in September 1992. Although informative, this snapshot will not help FAA to continually track modifications and repairs performed on the nation's aging fleet or capture future changes to airlines' plans made for economic and financial reasons. In addition, FAA safety inspectors told us that they place little emphasis

on verifying compliance with aging aircraft requirements over other similar inspection activities.

-- FAA has taken steps to enhance airport safety through its Runway Incursion Plan. Furthermore, in response to our recommendations, FAA is planning to establish priorities for projects in the plan, include project costs in quarterly reports to the Congress, and revise its criteria for determining which airports receive the new ASDE-3 ground radar system.¹ However, ASDE-3 has fallen further behind schedule, and its cost has increased by almost \$28 million since last year. Moreover, FAA plans to install ASDE-3 without correcting a radar display phenomenon that has been a concern to some air traffic controllers in the past. FAA might not remedy the phenomenon, known as the split target, until after 1994, at a cost to FAA of almost \$8 million. Nevertheless, we have supported--and continue to support--deploying the system while FAA explores solutions to the phenomenon.

-- During the initial implementation of TCAS, the system produced unnecessary alerts of potential collisions resulting in excessive altitude deviations (over 1,000 feet) and missed landing approaches. FAA believes it is on the verge of solving the problem and, in response to our recommendation, plans to share the results of a safety analysis and other tests of the potential system modification with the industry next week.² In addition, FAA expects to complete a rigorous quality check of TCAS' original software and the modifications in January 1993.

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FAA HAS NOT COMPLETED PLANNED
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FAA has made progress in addressing the safety risks posed by older aircraft--those over 20 years old or that have exceeded a certain number of takeoffs and landings established by the manufacturer--by issuing new requirements, which state that before mid-1994 aging aircraft must undergo extensive structural modifications or repairs. We reported in May 1991 and testified in September 1991 that because of the extensive amount of labor, key parts, and hangar space needed to do these modifications, some airlines--especially those in financial trouble--might have difficulty complying with the new requirements before the 1994 deadline.³ As noted earlier, last September FAA testified that by December 1991 it would do "all in its power" to monitor compliance with the new requirements, including establishing a data base for this purpose. However, FAA's plans to develop a tracking system have changed; the agency now intends to issue a one-time report of airline compliance plans. We also found that FAA safety inspectors are placing little emphasis on verifying compliance with aging aircraft requirements.

Let me provide more details on each of these issues.

FAA Has Not Developed the
Planned Data base

Although FAA's Associate Administrator for Regulation and Certification told this Subcommittee last year that FAA would develop a data base by December 1991 to track aging aircraft compliance, FAA officials now say they plan to collect airline

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A one-time report, while informative, is shortsighted because it will only provide a snapshot of compliance as of the summer of 1992. The usefulness of the report will be limited further because at the present time FAA headquarters officials told us that neither FAA nor inspectors will be provided the results from the individual airlines--data that would be extremely useful to provide continuous tracking and oversight in an ever-changing situation. Furthermore, FAA will find information on the status of the fleet and airlines' compliance with the new requirements more valuable as the aging fleet moves closer toward the 1994 deadline and beyond. According to officials from nine airlines, the financial health and the condition of the economy are causing them to continually alter their fleet plans. For example, one airline has prepared 15 plans over the last 12 months. Another airline returned to service previously retired aging aircraft because of increased passenger volumes. The dynamic nature of this industry demonstrates that the one-time only report could be outdated shortly after it is issued, perhaps even before it is submitted to the Congress.

Little Emphasis on Verifying Compliance
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FAA's policy states that surveillance is the most important function performed by field office personnel to ensure safe

operations and regulatory compliance. Because inspectors have other duties, FAA guidelines say that only 35 percent of an inspector's time should be spent on surveillance. Furthermore, FAA's written guidance covers a wide range of and places "high priority" on multiple activities, only one of which is inspecting for compliance with aging aircraft requirements. The guidance also allows inspectors discretion to determine which requirements they review.

The 10 principle maintenance inspectors with whom we met told us that they place little emphasis on verifying compliance with aging aircraft requirements over other similar inspection activities. The inspectors' statements are supported by FAA's Program Tracking and Reporting Subsystem (PTRS), which showed that between January 1991 and March 18, 1992, FAA had conducted about 2,000 inspections to verify compliance with airworthiness directives.⁴ Although we have identified reliability problems with PTRS, its data are the only available information to assess FAA's inspection program. Of the 2,000 inspections, 33 were aging-aircraft-related, and FAA observed compliance with the directives, ensured that paperwork was in order, and reviewed the aging aircraft programs of specific carriers. Thus, over the 15-month period, FAA inspectors focused on verifying compliance with aging aircraft requirements in only about 2 percent of their inspections.

RUNWAY INCURSIONS: PROGRESS HAS BEEN MADE,
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Serious runway incursions have had the public's attention since two 747s collided in 1977 at Tenerife Airport in the Canary

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Islands, killing 583 passengers and crew.⁵ More recently, accidents at Detroit Metropolitan, Los Angeles, and Atlanta airports have clearly demonstrated the need to reduce the risks of ground accidents at the nation's airports. The number of runway incursions has risen over the past several years, with a slight decline in 1991. There were 186 runway incursions in 1988, 223 in 1989, 281 in 1990, 244 in 1991, and 88 in the first 5 months of 1992. According to FAA officials, the number of runway incursions will not significantly decrease until the ASDE-3 ground radar is installed and fully operational at 29 of the nation's busiest airports. FAA estimates that all 29 systems will be installed by October 1993.

In July 1991, we testified on FAA's progress in developing and installing ASDE-3 and on the status of FAA's Runway Incursion Plan for enhancing safety at our nation's airports. At that time, we noted that the ASDE-3 deployment schedule had slipped by almost 4 years and a controversial problem with the radar's display had been discovered. This problem--known as the split target--only occurs when controllers use the "zoom" feature to take a closer look at some part of the airport surface. In this mode, the screen image of single targets--particularly aircraft with long fuselages--breaks into two or more images. We also noted that FAA may not have adequately considered some airports with questionable ground safety records as candidates for early ASDE-3 installation. Finally, we testified that the utility of FAA's Runway Incursion Plan would increase if FAA established funding levels and priorities for the 45 projects in the plan.

Implementation Continues to Slip and
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Since we testified last year, ASDE-3 installation at airports has fallen further behind schedule and costs have increased by almost \$28 million. In addition, FAA may not solve the split target phenomenon until fiscal year 1994, at the earliest. Last year, FAA planned to commission the first ASDE-3 radar at Pittsburgh Airport--after a delay of nearly 4 years--in April 1992, but power supply and software problems caused a postponement to August 1992. FAA expects an average delay of about 2 months in commissioning ASDE-3 at the remaining 28 airports if no further problems arise. Furthermore, in response to our recommendation, FAA is planning to revise its criteria for determining which additional airports receive ASDE-3.

Total estimated federal program costs to install ASDE-3 at the 29 airports increased from \$130 million in fiscal year 1991 to almost \$160 million in fiscal year 1992. (In September 1985, FAA estimated that total program costs would be \$96.8 million.) As reasons for the most recent increase, FAA cited the need to (1) purchase spare parts and negotiate a maintenance contract, (2) explore and implement solutions to the split target phenomenon, and (3) refine the site configuration for airports that require two systems.

Furthermore, FAA has not resolved the split target phenomenon. This issue remains controversial and needs to be resolved if ASDE-3 is to reach its full potential for preventing runway incursions. In the past, this issue has been a concern to some controllers. Although some FAA officials state that even with the split target ASDE-3 will significantly improve controllers' ability to track aircraft on the ground during periods of low visibility, FAA Air Traffic Service officials believe the problem must be addressed, and FAA is developing various solutions to do so. For example, FAA expects to provide controllers with audio and visual alerts of potential collisions through an ASDE-3 enhancement, the Airport Movement Area Safety System. FAA intended to award a production

contract for this enhancement in fiscal year 1993, but design problems and changing FAA requirements have caused a year's delay. Longer-term solutions, which require writing new software to mask the radar phenomenon that causes the split target, are estimated to cost FAA almost \$8 million and take several years to resolve.

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In January 1991, FAA released its Runway Incursion Plan, setting out goals and schedules for 45 projects and points of contact to facilitate agencywide and industry coordination. Since last year, FAA has completed many projects in the plan. For example, FAA has revised its standards for airport signs and markings, tested a lighting system for intersecting runways, and established pilot procedures for acknowledging clearances. Of the 45 projects, FAA has achieved its initial goals for 21, many of which airports can now implement. Others of the 21 projects will require attention from other FAA offices before they can be adopted by airports. For example, by January 1994, airports must comply with new sign and marking standards, but for other projects, such as the intersecting runway lighting system, FAA still needs to determine which airports would benefit most from such a system. In addition, although FAA is on schedule with 5 projects, the agency has experienced an average 8-month delay for 12 and placed 4 on hold. Three projects, such as reporting runway incursions, will continue indefinitely.

We previously recommended that FAA establish funding levels and priorities to ensure that more urgent projects are completed in a timely manner. FAA officials expect to set project priorities when the plan is updated later this year and to provide project costs in quarterly reports to the Congress, rather than in the updated plan. We are concerned about FAA's commitment to follow through with updating the plan and providing cost information to

the Congress. Last year FAA stated that it would update the plan by January 1992 but did not do so, and over the past 1-1/2 years, FAA has provided the Congress with only one quarterly report on the plan. Without project status or cost information, the Congress cannot determine if FAA has made progress on the plan or if FAA is allocating sufficient resources to preventing accidents on the nation's runways.

TCAS: AS IMPLEMENTATION CONTINUES,
SOME CONTROVERSY SUBSIDES

For more than 30 years, FAA and the aviation industry have been working to develop a system to prevent mid-air and near mid-air collisions.⁶ To ensure the success of these efforts, the Congress enacted legislation requiring that all commercial aircraft with over 30 passenger seats be equipped with TCAS by December 30, 1993. According to FAA's TCAS Program Manager, as of June 1992, about 65 percent of the designated aircraft were equipped with TCAS, and he is confident that airlines will successfully meet the December 1993 deadline.

TCAS backs up pilots' vision and the air traffic control system to ensure that a safe distance is maintained between aircraft in flight. Using a device that both transmits a signal and receives similar signals from other aircraft, TCAS determines the likelihood of other aircraft coming dangerously close and, if necessary, alerts the pilot to change course. Because of the need for quick and accurate advice and the close interaction between

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TCAS and pilots, FAA applied what it believed was a rigorous quality control process (referred to as verification and validation) while developing and testing the system to ensure that TCAS met specific technical requirements and users' needs.

In March 1992, we reported that both the Airline Pilots Association and FAA believe that TCAS adds a margin of safety to air travel. We also reported problems with the development and practical operation of TCAS. First, unnecessary alerts of potential collisions resulted in pilots' making excessive altitude deviations (over 1,000 feet) and missing landing approaches. Second, FAA had not effectively involved users--a key software quality control procedure--in the development of TCAS. According to pilots and air traffic controllers, the unnecessary alerts eroded their confidence in the margin of safety that TCAS provides. To reduce the number of such alerts, FAA had planned to modify TCAS, test it using a computer simulation, and study the safety impact of the changes. FAA had expected to make the modified system available to TCAS vendors at the end of March 1992. However, controversy within a TCAS review committee caused FAA to alter this timing.

The controversy centered on whether the rate of unnecessary alerts warranted modifying TCAS units already in use before FAA completed the quality control process to ensure that the system meets all technical requirements and satisfies users' needs. In an effort to resolve the issue, FAA postponed modifying TCAS until after the task force reviewed the test methodology and results--an action we recommended in March 1992. FAA published the results of the safety study and simulations a few weeks ago and recently flight-tested a modified TCAS unit against an aircraft that was not equipped with TCAS. Industry representatives plan to meet next week (August 10-12, 1992) to formally review the study and tests. As a result of these actions and FAA's commitment to complete the

quality control process for TCAS and the modifications in January 1993, the controversy within the industry seems to have diminished.

However, air traffic controllers continue to be concerned about TCAS. We previously reported that controllers were troubled by the increased and rapid communication between pilots and controllers when pilots asked about TCAS alerts, which increased controller work load and stress during high traffic periods. Subsequently, the National Association of Air Traffic Controllers (NATCA) sent a letter to FAA's Associate Administrator for Air Traffic requesting that the separation between aircraft be increased because of its concerns about TCAS. NATCA believes that TCAS interferes with controllers' ability to ensure safe separation between aircraft because TCAS advisories sometimes contradict controllers' instructions. NATCA believes pilots should receive air traffic control information from one source--the controller.

CONCLUSIONS

Although FAA has developed requirements to deal with the safety of aging aircraft, we do not see significant follow-through on this intention in the locations where safety inspections and compliance monitoring actually take place--the maintenance bays and hangars around the country. As airlines alternatively retire and return to service older aircraft to meet the changing demand for air travel, oversight of the nation's older aircraft becomes increasingly important to maintaining safety. We believe that it is critical for FAA to follow up on its efforts to develop and maintain an industrywide, periodically updated data base and make aging aircraft compliance inspections an integral part of safety inspectors' assignments.

In addition, FAA has recently made progress on TCAS, but several issues remain unresolved. Finally, procurement problems with ASDE-3 persist, and the split target phenomenon remains

unresolved. Although some FAA officials would not field the system until this issue is resolved, we have supported--and continue to support--deploying the system while FAA explores solutions to the phenomenon. Moreover, FAA needs to complete its plans and establish priorities and cost estimates for the Runway Incursion Plan projects.

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Mr. Chairman, this concludes our statement. We would pleased to respond to questions at this time.

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TCAS backs up pilots' vision and the air traffic control system to ensure that a safe distance is maintained between aircraft in flight. Using a device that both transmits a signal and receives similar signals from other aircraft, TCAS determines the likelihood of other aircraft coming dangerously close and, if necessary, alerts the pilot to change course. Because of the need for quick and accurate advice and the close interaction between TCAS and pilots, FAA applied what it believed was a rigorous quality control process (referred to as verification and validation) while developing and testing the system to ensure that TCAS met specific technical requirements and users' needs.

In March 1992, we reported that both the Airline Pilots Association and FAA believe that TCAS adds a margin of safety to air travel. We also reported problems with the development and practical operation of TCAS. First, unnecessary alerts of potential collisions resulted in pilots' making excessive altitude deviations (over 1,000 feet) and missing landing approaches. Second, FAA had not effectively involved users--a key software quality control procedure--in the development of TCAS. According to pilots and air traffic controllers, the unnecessary alerts eroded their confidence in the margin of safety that TCAS provides. To reduce the number of such alerts, FAA had planned to modify TCAS, test it using a computer simulation, and study the safety impact of the changes. FAA had expected to make the modified system available to TCAS vendors at the end of March 1992. However, controversy within a TCAS review committee caused FAA to alter this timing.

The controversy centered on whether the rate of unnecessary alerts warranted modifying TCAS units already in use before FAA completed the quality control process to ensure that the system meets all technical requirements and satisfies users' needs. In an effort to resolve the issue, FAA postponed modifying TCAS until after the task force reviewed the test methodology and results--an action we recommended in March 1992. FAA published the results of the safety study and simulations a few weeks ago and recently flight-tested a modified TCAS unit against an aircraft that was not equipped with TCAS. Industry representatives plan to meet next week (August 10-12, 1992) to formally review the study and tests. As a result of these actions and FAA's commitment to complete the

references to TCAS are to TCAS II.

quality control process for TCAS and the modifications in January 1993, the controversy within the industry seems to have diminished.

However, air traffic controllers continue to be concerned about TCAS. We previously reported that controllers were troubled by the increased and rapid communication between pilots and controllers when pilots asked about TCAS alerts, which increased controller work load and stress during high traffic periods. Subsequently, the National Association of Air Traffic Controllers (NATCA) sent a letter to FAA's Associate Administrator for Air Traffic requesting that the separation between aircraft be increased because of its concerns about TCAS. NATCA believes that TCAS interferes with controllers' ability to ensure safe separation between aircraft because TCAS advisories sometimes contradict controllers' instructions. NATCA believes pilots should receive air traffic control information from one source--the controller.

CONCLUSIONS

Although FAA has developed requirements to deal with the safety of aging aircraft, we do not see significant follow-through on this intention in the locations where safety inspections and compliance monitoring actually take place--the maintenance bays and hangars around the country. As airlines alternatively retire and return to service older aircraft to meet the changing demand for air travel, oversight of the nation's older aircraft becomes increasingly important to maintaining safety. We believe that it is critical for FAA to follow up on its efforts to develop and maintain an industrywide, periodically updated data base and make aging aircraft compliance inspections an integral part of safety inspectors' assignments.

In addition, FAA has recently made progress on TCAS, but several issues remain unresolved. Finally, procurement problems with ASDE-3 persist, and the split target phenomenon remains unresolved. Although some FAA officials would not field the system until this issue is resolved, we have supported--and continue to support--deploying the system while FAA explores solutions to the phenomenon. Moreover, FAA needs to complete its plans and establish priorities and cost estimates for the Runway Incursion Plan projects.

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Mr. Chairman, this concludes our statement. We would pleased to respond to questions at this time.

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