



Boeing 727 maintenance

Chapter 4: New Challenges - New Duties

The presidential candidates in the 1968 campaign did not focus on aviation as a national priority. Although they understood the immediate concerns faced by FAA and the aviation community, they could not foresee the new problems the agency would have to solve as it entered its second decade of operation. In addition to growing concerns about national airspace system (NAS) modernization and air traffic controller unrest, the FAA found itself facing new airport, security, and environmental challenges.

In November 1968 President-elect Richard Nixon announced that an urgent priority of his administration would be to strengthen the air traffic controller workforce, improve their working conditions, and provide them with new equipment needed to keep the airways safe. Heartened by these remarks, the Professional Air Traffic Controllers Organization (PATCO) became more vocal in its calls for system modernization and better working conditions. On January 15, 1969, the Civil Service Commission ruled that PATCO



The advent of wide-body commercial airliners, such as the Boeing 747, helps usher in new challenges for FAA

was an employee organization, not a professional society, because it had sought and obtained a dues withholding agreement. FAA had agreed to permit a voluntary payroll deduction plan for the payment of PATCO dues with the understanding that PATCO

would remain a professional society. As a result, PATCO became subject to the Standards of Conduct and the Code of Fair Labor Practices and eligible for formal recognition as a labor bargaining organization.

On January 20, 1969, Richard Nixon became President of the United States, succeeding Lyndon Johnson. Two days later, John Volpe became Secretary of Transportation. On March 24 **JOHN SHAFFER [TERM: 03/24/69 – 03/14/73]** became the fourth FAA Administrator. A West Point graduate and World War II pilot, Shaffer left the military in 1954 for a civilian career. He came to FAA from TRW, a corporation involved in a number of businesses, most defense-related, but including aerospace, where he had served as a corporate vice president.



Administrator John Shaffer

Labor Issues

Labor issues occupied Administrator Shaffer's early months in office. On June 11, 1969, PATCO's western coordinator notified his organization's Southwest delegates of upcoming FAA testimony before Congress on a controller career bill. "If testimony [is] not favorable," he wrote, "D-Day is June 18th!" The June 17 congressional hearings focused on legislation to provide higher pay, early retirement, and other benefits for controllers. In testimony to a congressional committee, Administrator Shaffer opposed the proposed legislation and characterized controllers as well paid, considering their educational level. That evening, PATCO counsel

F. Lee Bailey appeared on the NBC “Tonight Show” and reportedly told host Johnny Carson, “I’d start walking if I were you.” From June 18-20, a number of FAA facilities felt the effects of a work slow down by PATCO-affiliated air traffic controllers, who claimed illness and did not report for work. Of 477 controllers who took sick leave during the job action, FAA suspended 80 of them anywhere from three to fifteen days.

On July 27 FAA terminated its dues-withholding agreement with PATCO, stating that it was not in the public interest to assist an



1970s, flight service station

organization taking part in an illegal job action. Hoping to alleviate labor tensions, on August 8, Secretary of Transportation John Volpe established an Air Traffic Controller Career Committee. The seven-member group headed by professional

consultant John Corson, investigated controller employment practices, employee compensation, work environment, training, and employee-management relations. The committee gave special attention to controller occupational stress.

As the Corson committee began its work, PATCO fought Administrator Shaffer’s decision to terminate its dues withholding

agreement. PATCO now sought formal FAA recognition as a labor union. On October 27 FAA denied PATCO’s request because of its participation in the June sickout. Two days later, however, President Nixon issued Executive Order 11491, replacing Executive Order 10988 as the basis for federal employee-management relations. The order, which went into effect on January 1, 1970, gave the Labor Department authority to grant exclusive recognition to unions comprised of federal workers.

A new round of tensions between PATCO and FAA began in October 1969. In reaction to the involuntary transfer of three controllers from the Baton Rouge, Louisiana, combined station-tower, PATCO threatened a national demonstration. Rhetoric and threats bounced back and forth between PATCO and FAA for several months with no resolution. At a January 15, 1970, press conference, PATCO threatened a national strike beginning on February 15. In the meantime, FAA reexamined the basis and legality of the transfer of the three controllers from Baton Rouge and submitted a fact-finding report to the Secretary of Transportation in March.



1970s, tower controller work station

As the controversy over the transfer of the three controllers intensified, on January 29, 1970, the Corson committee submitted its report to Secretary Volpe. The committee recommended that the secretary:

- Reduce the overtime work required of controllers in high-density areas;
- Reduce the consecutive hours spent by controllers in operational positions to two, and the total hours per day on such positions to six;
- Detail qualified journeyman controllers to high-density facilities with critical manpower shortages;
- Develop a more mobile controller work force so that the needs of the system, rather than the preferences of controllers, determine assignments;
- Develop incentives to attract the most talented controllers to the most difficult positions;
- Pay special rates for employment in facilities located in high-cost-of-living areas;
- Accelerate and improve training of developmental controllers;
- Seek legislation providing for the early retirement of controllers who attain a certain age and cannot be retained or reassigned to less arduous duty — e.g., retirement at age 50 after 20 years of air traffic control service with 50 percent of high-three average salary; and
- Designate a single official immediately responsible to

the FAA Administrator to handle all relationships with employee organizations at the national level.

Several of the committee's recommendations — including detailing journeyman controllers to facilities with critical manpower shortages and providing developmental controllers with “updated” training — received immediate attention. In addition, FAA established nine groups to

consider the remaining recommendations and develop programs for their implementation. Unfortunately, the report and subsequent actions by FAA and Department of Transportation (DOT) came too late to stop the planned PATCO sickout, called an illegal strike by DOT.

Hoping to prevent the strike threatened for February 15, Secretary Volpe entered into discussions with PATCO. Both sides agreed to let the Department of Labor Mediation and Conciliation Service arbitrate the controversial transfers. Three days later, PATCO filed a petition, as permitted by Executive Order 11491, with the Federal Labor Relations Council for certification as exclusive bargaining representative for all non-supervisory air traffic control specialists.

On March 17, acting on the FAA fact finding report regarding the transfer of the three Baton Rouge controllers, Secretary Volpe upheld the FAA order calling for the transfer. On March 23 FAA appointed a director of labor relations per recommendation of the Corson Committee. Two days later, approximately 3,000 air traffic controllers participated in a PATCO-organized sickout. All but a few of those involved were en route, rather than terminal, controllers. Some remained absent for a day or two, others for the full 17-day sick out period. Long delays and flight cancellations ensued. FAA Administrator Shaffer refused to



1970s, ARTCC



1970s, tower controllers

negotiate with the controllers, and instead asked for a federal court injunction to force PATCO to order its members back to work.

Although the absentees claimed sick leave, DOT viewed their action as a strike against the U.S. Government and hence illegal. *[The Labor Management Relations Act of 1947 had codified the long-standing prohibition of federal employee strikes.]* The government obtained temporary restraining orders against PATCO. When the union failed to comply with these orders, a show-cause order was obtained against its officers. The heavy fines levied on the union by the court ended the sickout on April 10. FAA then suspended nearly 1,000 controllers and fired 52 for their role in the affair. *[On February 5, 1981, the United States Court of Appeals, District of Columbia Circuit, reversed the suspensions.]*

On April 23 PATCO elected a new president, John Leyden. Within a month, he appeared at a Department of Labor hearing stemming from his organization's February request to be certified as the exclusive bargaining representative for all non-supervisory air traffic control specialists. It took the Labor Department almost a year to pass judgment on the PATCO petition. Meanwhile,

PATCO faced strong protests from the aviation community over the strike. The Air Transport Association, for example, filed a \$50 million damage suit against the union. As part of a September 10, 1970 order, the court placed PATCO under a permanent injunction against any future job action.

As the conflict with PATCO began to ease, FAA worked to implement more of the Corson Committee recommendations. In November 1970 the agency established a national en route air traffic training program for center controllers joining the workforce. The program used the FAA Academy for qualification training and FAA facilities for proficiency training. Its objectives included shortening the training, reducing the high attrition rate among trainees, and making more efficient use of resources. The training itself was conducted in three phases. The first phase, indoctrination and precontrol, took place at an en route facility and covered duties unrelated to air traffic control. The next phase, control, was conducted at the FAA Academy and consisted of a nine-week non-radar and radar control procedures course. The final phase, sector qualification, took place at an en route facility. Previously, controller trainees had been sent directly to the FAA Academy for a nine-week indoctrination course, and then to the centers for on-the-job training running from two to three years.

The Department of Labor ruled on PATCO's petition to become a bargaining representative on January 29, 1971. Because PATCO had called a strike against the federal government, the Department of Labor stripped it of its organizational status for sixty days and required it to post a notice declaring that it would not engage in illegal job actions. Only then would it be re-considered for recognition as a labor organization.



Air traffic control tower at Dallas/Ft. Worth International Airport



ARTCC controllers

PATCO took this and other steps to comply with the Labor Department's decision. On June 4 the Department of Labor again allowed PATCO to seek recognition to represent the labor interests of all air traffic controllers under Executive Order 11491. Three days later PATCO filed a new petition.

National Association of Air Traffic Specialists

On December 27, 1971, the Department of Labor gave the National Association of Air Traffic Specialists (NAATS) approval to serve as the national bargaining unit for all flight service station specialists,



Flight service station specialists provide weather and other flight planning information to pilots

those controllers who supported general aviation pilots. Following a nationwide election in February 1972, NAATS received Department of Labor

certification as the national exclusive representative for all flight service station specialists, some 3,000 employees. FAA and NAATS concluded an agency-wide collective bargaining agreement on June 1, 1972, the first such contract between FAA and a national labor organization and the first in a series of FAA/NAATS contracts. The NAATS contract gave PATCO hope for approval of its second petition, and by the end of fiscal year 1973, PATCO earned recognition as a national bargaining unit.

A presidential reelection campaign that courted labor support was underway. On February 2, 1972, under White House pressure, FAA announced that air traffic controllers fired for their activist roles in the 1970 strike could apply for re-employment. Of the 52 controllers dismissed, 46 applied and were rehired. Three months later, President Nixon signed into law the Air Traffic Controllers Career Program Act (Public Law 92-297). An outgrowth of a Corson committee recommendation, the law permitted controllers to retire after 25 years of active duty, or at age 50 if they had 20 years of active service. The legislation also established a mandatory age for retirement at 56, with exemptions at the discretion of the Secretary of Transportation up to age 61. Furthermore, it provided for a "second career program" of up to two years of training at government expense for controllers who had to leave their previous work because of medical or proficiency disqualification.

National R&D Policy

Although aviation provided a safe and reliable form of transportation, many in the federal government believed that more could and should be done to explore new technologies. Research and development (R&D) of new systems would benefit aviation by increasing safety and efficiency and reducing aviation's environmental impact. In 1969 FAA teamed with DOT and



Aircraft fire test

the National Aeronautics and Space Administration (NASA) to undertake a study on civil aviation research and development, known as the CARD study. The three-year study resulted in a comprehensive review of national policies affecting civil aviation.



General aviation accidents increase calls for safety research

It covered the benefits of civil aviation, the investments needed for R&D, and the legal, regulatory, and organizational environments that affect the ways in which R&D products were transitioned into operation, and the ways in which civil aviation grew in response to new technology.

Researchers preparing the study reported that R&D had been a major contributor to civil aviation's growth and had produced significant improvements in safety, economy, speed, capacity, and range. Since World War II, aircraft productivity [measured in seat-miles per hour] had increased by a factor of 20; direct operating costs reduced by a factor of 3; and accident rates reduced by a factor of

about 5. In the same period, revenue passenger-miles increased by a factor of about 30, revenue ton-miles by about 50, the number of aircraft handled in the airways system by about 8, and the general aviation fleet by about 4. Overall, aviation had increased from a 0.2 percent gross national product contribution in 1949 to a one-percent contribution in 1969.

The study team found a number of federal agencies, including the Office of Management and Budget, the National Aeronautics and Space Council, the Office of Science and Technology, DOT, FAA, the Departments of Commerce and Defense, and NASA, influenced civil aviation R&D policies and priorities. Team members recommended organizational and policy changes to improve intragovernmental cooperation and coordination in civil aviation matters. Other conclusions, included:

- R&D was too narrowly defined by the federal government, which tended to isolate R&D from policy and economics.
- Civil aviation R&D should be redefined to include both "hard" and "soft" sciences.
- Agencies should receive continued and consistent federal funding of aeronautical research to ensure the maintenance of a strong civil aviation technical base.
- The federal government should consider committing substantial resources to "market demonstration programs" that would provide a unique opportunity to overcome institutional inertia and test possible solutions to civil aviation problems (needs), without committing resources to a full blown system which might not succeed.
- The need for new aviation technology should be translated into a clear market to which private enterprise could respond (i.e., technology transfer).

The CARD study, released in March 1971, recommended immediate R&D emphasis on aircraft noise abatement and the relief of

congestion. Solving the noise problem required balanced R&D programs to reduce noise generated by aircraft, optimize the flight path of aircraft through use of steep descent and curved approaches, and develop better plans for the use of land adjacent to airports. The congestion solution necessitated an organized effort directed at the combination of air traffic control, runway capacity, and airport development. The airways system had to be upgraded to increase both capacity and safety as well as to bring rising operating costs under control. A new short-haul system was also proposed as a way to relieve congestion at existing airports, especially those in areas of high traffic density.

The study concluded that a healthy civil aviation industry and transportation system provided a variety of significant benefits to the United States. Hence, the federal government should take an active role in developing a national aviation policy and conducting R&D to benefit civil aviation.

The ad hoc air traffic control panel of the President's Science Advisory Committee also released a report, "Improving the Nation's Air Traffic Control System," in March 1971. The panel's report started with a quote from Richard Nixon:

Years of neglect have permitted the problems of air transportation in America to stack up like aircraft circling a congested airport. The challenge confronting us is not one of quality, or even of technology. Our air traffic control system is the best in the world; our airports among the finest anywhere. But we simply do not have the capacity in our airways and airports ample to our present needs or reflective of the future. . . . development for the 1980s and beyond cannot be neglected. Technology is moving rapidly and its adaptation to provide future solutions must keep pace. [See http://fas.org/rig/PSAC_ATC_Report2.pdf.]

Panel members pointed out that the demand for air traffic services would increase threefold by 1980 and eightfold by 1995. They recommended development of a satellite-based navigation system. In this new system, FAA's strategic control of aircraft would be automated and each properly equipped aircraft would exercise tactical control of its own flight path through the use of accurate three dimensional navigation, air ground datalink, all-weather landing systems, and suitable aircraft displays. To achieve this new system, the panel recommended immediate improvements to the current system and the development of a future system based on higher levels of automation and the use of satellites. They said broad-based R&D programs were needed to provide near-term improvements and new technology for the long term to improve control automation, data acquisition, navigation, landing, and communication subsystems, airports, and airborne equipment.



Aviation growth requires greater airport capacity

Aviation and the Environment

An economic boom in the 1960s brought with it growing concerns about pollution and noise. Aviation, on the cutting edge of technological innovation, became an early area of concern for the public, especially as more and more airplanes traversed the NAS. Between 1966 and 1968 FAA researchers had worked to understand the physical and psychological characteristics of noise and the state of the art in noise reduction techniques. The research produced

tools such as a noise exposure forecast, which measured the noise imprint of jet aircraft. Researchers developed the effective perceived noise level in decibel scale (EPNdB), incorporating the frequency and duration of noise into an index of the psychological impact of noise at certain frequencies and intensity levels. The agency also worked with NASA to conduct basic research in engine nacelle design and muffling, quiet engine technology, and flight procedures designed to minimize noise.

By July 21, 1968, when President Johnson signed the Aircraft Noise Abatement Act (Public Law 90-411), the agency's R&D program had started a number of noise abatement programs. The new act vested in the FAA Administrator the power, after consultation with the Secretary of Transportation, to prescribe and amend standards for the measurement of aircraft engine noise and sonic boom, prescribe noise standards as criteria for aircraft certification, require the retrofit of existing aircraft with quieter engines or noise-abating devices, enforce operating procedures that reduce noise, and ban overland supersonic flights of civil aircraft.

With these measures in place, when Administrator Shaffer came to the FAA in 1969, the agency was poised to begin its new mandate to

regulate aircraft noise. On December 1, 1969, FAA added a new Part 36 to the Federal Aviation Regulations that established allowable engine-noise levels as part of the criteria for transport aircraft

type-certification. The new rule was the first issued under Public Law 90-411. The rule applied to all subsonic aircraft in the transport category and all subsonic turbojets, regardless of category, for which an application for a type certificate was made after January 1, 1967. The allowable noise levels varied with aircraft size and type, ranging from 93 to 108 EPNdB. The noise limits also varied according to the type of aircraft operation — between 102 and 108 EPNdB on approach, and between 93 and 108 EPNdB during takeoff. The agency further limited sideline noise — noise created along the runway or taxiway during idling or taxiing — to a range between 102 and 108 EPNdB.



Ensuring aviation remains a good neighbor



New rules set jet engine noise limits

A FAA reorganization in December 1970 reflected the growing importance of understanding and regulating aviation's impact on the environment. The agency established the office of environmental quality and simultaneously abolished the office of noise abatement. This organizational change reflected FAA's expanding responsibilities in such areas of environmental quality as aircraft noise abatement, sonic boom, emissions, pollution, and aircraft waste. The reorganization came just in time to implement a new law. President Nixon signed the Clean Air Amendments (Public Law 91-604) on December 31, 1970. The legislation gave the recently created Environmental Protection Agency (EPA) responsibility

for developing aircraft engine emission standards to control air pollution.

While environmental research continued, FAA implemented new procedures to reduce noise. On February 4, 1971, the agency instituted the “Keep-’Em-High” program. Applying this procedure, the agency instructed controllers to keep flights as high as possible during landings and takeoffs, delaying turbojet aircraft in their final descent until relatively close to their destination airport and climbing them out as rapidly as possible after takeoff. Where aircraft performance capabilities and considerations of passenger safety and comfort permitted, FAA required turbojet aircraft to be kept at 10,000 feet or higher until within 30 miles of the airport. Within five months, the program had been implemented at 387 airports, nearly all those airports

serving scheduled air carrier and turbojet aircraft.

In a companion program implemented on August 1, 1972, FAA began a new “Get-’Em-High Earlier” departure procedure to reduce jet aircraft noise over airport communities nationwide. The new departure procedure, developed jointly with

the Air Transport Association, was used by 23 U.S. airlines while operating out of most of the nation’s air carrier airports. The pilots

would climb at full power to 1,500 feet, instead of 1,000 feet under the old system. Noise relief due to the higher altitude would be most noticeable from three to six miles from lift-off.



New aircraft designs and procedures reduce airport noise

and determined whether the standards proposed by EPA were consistent with safety, economically reasonable, and technologically practicable. FAA had responsibility to implement and enforce the EPA’s feasible recommendations.

In the first major test of the new law, on July 6, 1973, EPA issued air pollution standards for aircraft engines and a timetable for their implementation. Formulated after considerable consultation with FAA and industry, the new standards applied to nearly all civil subsonic aircraft, and limited emission of smoke, carbon monoxide, hydrocarbons, and nitrogen oxides. To begin implementation of the standards, on October 26, 1973, FAA published a rule requiring newly produced aircraft of older type designs, such as the DC-9 or Boeing 727, to meet noise standards for turbojet and transport aircraft. The standards had previously applied only to newly type-certified aircraft.

To define the FAA and EPA roles, on October 27, 1972, President Nixon signed the Noise Control Act of 1972 (Public Law 92-574). Under the act, EPA recommended noise standards to FAA based on considerations of public health and welfare. FAA, in turn, considered the recommendations,



1960s, jet emissions increase public concerns

Airport Development

With continued growth in the nation's airspace, it quickly became evident that airport capacity had to be increased to reduce system delays. Between mid-1959 and mid-1969, the number of aircraft handled by FAA's air route traffic control centers had increased by 110.6 percent, and the number of aircraft operations at FAA's airport traffic control towers had increased by 112 percent. Federal airport and airway development programs, less than adequately funded, failed to keep pace with the growth in aviation activity, resulting in a severe strain on the air traffic control system. Schedule delays cost



1960s, airport capacity becomes a growing concern

the air carriers millions of dollars annually, not to mention the cost to passengers over and above inconvenience and discomfort. Shortly after Administrator Shaffer took office, FAA issued a report recommending ways of relieving congestion at 18 of the nation's busiest airports. The short-range recommendations included improving traffic flow on the airfield through additional runway exits, access taxiways, holding and staging aprons, expanded terminal aprons, and creating additional runway capacity. Long-range recommendations included review of noise-abatement procedures and restrictions, construction of new general aviation airports and new air carrier airports, installation of navigation aids, and installation of landing aids at reliever airports to attract general aviation traffic.

Key to easing airport congestion was the need for a new and stable source of funding to finance airport improvements and new construction. On June 16, 1969, the Nixon Administration submitted legislative proposals to

Congress to expand and improve the nation's airway and airport systems. The legislation, known as the Aviation Facilities Expansion Bill of 1969, proposed ways to raise the necessary revenue to support this expansion. The proposals included:



1960s, aviation growth requires new and expanded runways

- Increasing the outlay for airway facilities and equipment to \$250 million a year over the next ten years. (During the decade of the sixties, annual appropriations for airway facilities and equipment averaged \$93 million.)
- Increasing the average yearly federal outlay for airport development to \$250 million over the next ten years. (In the past, Congress had appropriated approximately \$65 million a year in Federal Aid to Airport Funds.)
- Imposing an 8 percent tax on domestic airline passenger tickets, a \$3 surcharge on passenger tickets for international flights originating in the United States, a five percent tax on air-freight waybills, and a 9¢ per-gallon tax on gasoline and jet fuel used by general aviation aircraft.
- Placing the revenues generated by the new taxes in the U.S. Treasury, in a designated account that would be used exclusively for airway and airport development.

After considerable debate, especially on funding issues, Congress approved many of the president's recommendations. On May 21, 1970, President Nixon signed Public Law 91-258. Title I of the law was the Airport and Airway Development Act of 1970, and Title II was the Airport and Airway Revenue Act of 1970. The new legislation assured a fund of about \$11 billion over the next decade for airport and airway modernization. Establishing an Airport and



More air passengers equals greater congestion in airport terminals

- An eight percent tax on domestic passenger fares;
- A \$3 surcharge on passenger tickets for international flights originating in the United States;
- A 7¢ per gallon tax on both gasoline and jet fuel used by aircraft in noncommercial aviation;
- A five percent tax on airfreight waybills; and
- An annual registration fee of \$25 on all civil aircraft, plus (1) in the case of piston-powered aircraft weighing more than 2,500 pounds, a charge of 2¢ for each pound of maximum certificated takeoff weight, or (2) in the case of turbine powered aircraft, a charge of 3.5¢ for each pound of maximum certified takeoff weight.

Airway Trust Fund modeled on the Highway Trust Fund freed airport and airway development from having to compete for General Treasury funds. Revenues for the new trust fund came from a number of levies on aviation users:

The act authorized \$280 million for each of the next five fiscal years and provided a new distribution formula improved in the light of the experience under the Federal Airport Act. To relieve congestion at airports serving

other segments of aviation, \$250 million would be distributed, as matching funds, among airports serving air carriers certified by the Civil Aeronautics Board (CAB) and airports primarily serving general aviation. The remaining \$30 million of the annual \$280

million would be apportioned by the Secretary of Transportation for developing airports in the several states and in Puerto Rico, Guam, and the Virgin Islands serving segments of aviation other than certified air carriers.

The new law authorized the Secretary of Transportation to make grants of funds to appropriate agencies for airport system planning and to public agencies for airport master planning. On July 1, 1970, FAA accepted the first applications for federal assistance under the Airport Development Aid Program (ADAP). The agency announced the first three grants under the program on August 6: Detroit Metropolitan-Wayne County Airport (Michigan), Hector Field (Fargo, North Dakota), and Minneapolis-St. Paul International Airport (Minnesota).



Airports prepare for growth through long-term planning

When the Nixon Administration proposed to obligate less than the minimum annual levels specified in the Airport and Airway Development Act for airport-airway capital investments in its fiscal year 1972 budget proposal, Congress amended the act. In the November 1971 amendment, Congress specified that:

- No trust fund money could be appropriated to carry out any program or activity under the Federal Aviation Act other than “acquiring, establishing, and improving air navigation facilities;”
- Any excess of trust fund receipts over airport-airway capital investments could be applied toward the cost of administering the airport and airway development programs; and
- Funds equal to the minimum amounts authorized for each fiscal year for airport and airway development must remain available in the trust fund until appropriated for airport-airway development.



Airport improvements aid both commercial and general aviation pilots

An important provision of Airport and Airway Development Act gave FAA a new responsibility — safety certification of airports served by air carriers. The law mandated that by May 21, 1973, all U.S. airports serving scheduled

air carriers holding CAB certificates of public convenience and necessity must have FAA operating certificates as well. The new

legislation also set standards for the marking and lighting of areas used for operations, firefighting and rescue equipment and services, the handling and storing of hazardous materials, the identification of obstructions, and safety inspection and reporting procedures. In addition, it required airport operators to have a FAA-approved operations manual. FAA awarded the first operating certificate to Boston Logan airport on September 1, 1972, and had certified nearly 500 airports by the May 1973 deadline.

FAA issued its first national airport system plan in September 1973. The new document replaced the former national airport plan, last published in 1967. The replacement plan defined the relationship



New facilities and equipment help controllers meet growing needs

of each airport to the local transportation system, to forecasted technological developments in aeronautics, and to developments forecasted in other modes of intercity transportation. It also included a discussion of those factors affecting the quality of the natural environment. To keep pace with the projected growth of air

traffic, the plan forecast a need for 700 new airports in the United States over the next ten years. The agency estimated the overall cost of building the new airports and upgrading existing facilities at \$6.3 billion.

The Airport Development Acceleration Act of 1973 (Public Law 93-44) amended the Airport and Airway Development Act of 1970. The changes increased the annual funding level for ADAP from \$280 million to \$310 million, raised the federal share for the program's development of general aviation airports and smaller air carrier airports (identified as those that enplaned less than one percent of the passengers serviced by all the air carriers certified by the Civil Aeronautics Board) from 50 percent to 75 percent, and obligated the federal government to pay 82 percent of the costs of safety equipment required for airport certification, as compared to the 50 percent for which it had previously taken responsibility. The amendment also prohibited states and localities from levying a "head tax" on passengers.

Air Traffic Control System Modernization

In a December 1969 report to the Secretary of Transportation, the FAA Air Traffic Control Advisory Committee predicted a continued rise in the demand for air traffic control services during the decades ahead. Committee members stated that if FAA expected to accommodate the anticipated growth in aviation traffic, three critical problems



1970, Wichita, Kansas FSS

required solutions: the shortage of terminal capacity, the need for new means of assuring separation, and the limited capacity and increasing cost of air traffic control. The committee believed that major improvements in airport capacity could be achieved through the use of parallel runways, high speed turnoffs, advanced terminal automation, and reduced longitudinal separation between aircraft on final approach for landing. For the safe separation of aircraft, the committee recommended further efforts to upgrade radar beacon transponders for tracking aircraft. It also noted that a higher level of automation would enable the system to handle perhaps two or three times the 1969 traffic with the same controller work force.

Like airports, airway modernization received a big boost from increased funding authorized by the Airport and Airway Development Act of 1970. Throughout the decade of the sixties, appropriations for airway facilities and equipment had averaged \$93 million a year. The Airport and Airway Development Act authorized not less than \$250 million a year for the next five fiscal years for acquiring, establishing, and improving air navigation facilities.

To help monitor and even restrict flights moving from one air route traffic control center (ARTCC) to another, FAA established the Central Flow Control Facility at its headquarters as a permanent part of the air traffic control (ATC) system. Opened in April 1970, the new facility relieved the ARTCCs of some



1975, TRACON controllers

responsibility for restricting the number of aircraft moving between them. Central Flow Control collected and correlated systemwide air traffic and weather data, using the information to prevent isolated clusters of congestion from disrupting the overall traffic flow. Linked



1994, Command Center opens in Herndon, Virginia

by teletypewriter and telephone to all 21 ARTCCs, the facility detected potential trouble spots and suggested such solutions to the centers as flow-control restrictions or rerouting. While the individual ARTCCs retained the authority to accept or reject the Central Flow Facility's recommendations, the decisions were now based on broad information about the overall condition of the ATC system. On July 29 FAA established the Air Traffic Control Systems Command Center to integrate the functions of the Central Flow Control Facility, Airport Reservation Office, the Air Traffic Service Contingency Command Post, and Central Altitude Reservation Facility. *[On April 15, 1994, the Air Traffic Control System Command Center officially began operations in its new facility at Herndon, Virginia. The facility moved from FAA Headquarters because of size and technological constraints.]*

FAA introduced major changes in the New York metropolitan area's air traffic patterns and procedures in June 1970. Collectively known as New York Metroplex, the new procedures reduced traffic congestion in and around New York airports, and accelerated the movement of aircraft along major north-south routes. Under

Metroplex, primary holding patterns, or arrival fixes, for area airports were moved farther out from the center of the city. This enabled FAA to add five new en route corridors, which increased the number of departure routes, improved traffic distribution, and reduced bottlenecks.

FAA also established the terminal control area (TCA) concept in June 1970. The agency hoped the use of TCAs would minimize the midair collision hazard around the nation's busiest airports. A TCA consisted of controlled airspace within which all aircraft would be subject to special operating rules and requirements affecting pilots and equipment. While the boundaries of each TCA would be determined separately, the general shape would tend to resemble an inverted wedding cake with its smallest layer touching the ground. TCAs were broken into two categories, with the most congested locations designated as Group I. The rules for Group I required:

- Air traffic control clearance for all operations.
- Large turbine-powered aircraft to stay above the TCA's floor unless otherwise authorized by air traffic control.
- The speed limit beneath the TCA's lateral limits to be 200 knots (230 mph).
- Takeoffs and landings by solo student pilots to be banned.
- Aircraft to carry an operable two-way radio.
- Fixed-wing aircraft to carry an operable receiver for standard navigation aids such as the very high frequency omnidirectional range (VOR) or tactical air navigation (TACAN), as well as a radar beacon transponder. The transponder requirement did not apply to instrument flight rules (IFR) operations to and from secondary airports within the TCA.

For Group II TCAs, the rules were the same as for Group I except that solo student operations were permitted and aircraft using visual flight rules (VFR) did not have to carry transponders.

FAA made great strides in automating the air traffic control centers in the 1970s. Ceremonies at the Memphis Air Traffic Control Center in February 1973 celebrated the center's switch over to computer processing of flight-plan data. This achievement entailed completing phase one of the NAS En Route Stage A, FAA's decade-long program to automate and computerize the nation's en route air traffic control system. With the new computer installation at Memphis, each of the twenty ARTCCs in the contiguous 48 states gained an automatic capability to collect and distribute information about each aircraft's course and altitude to all the sector controllers

along its flight path. Pilots still had to file flight plans at flight service stations and military operations offices, but now computers would handle the functions of assigning and printing out controller flight strips.

The new computers recorded and distributed any changes registered in en route aircraft

flight plans. The system eventually tied in with the third version of the Automated Radar Terminal System (ARTS) units, then being installed at major airports. The ARTS III system electronically tagged radar blips on the controller's scope with luminous letters and numbers called alphanumerics that provided the target aircraft's identity and altitude. Phase two of the en route automation program, then underway, would provide controllers at the twenty centers with new radar displays that would show such vital flight information as altitude and speed directly on the screen.



IBM 9020 equipment at the Jacksonville ARTCC

Securing the Airways

In January 1969 FAA faced a growing airline security problem. During the month, eight U.S. airliners were hijacked to Cuba. In February, FAA created an eight-man Task Force on the Deterrence of Air Piracy that combined a broad spectrum of expertise under the leadership of the deputy federal air surgeon. Systematic study by the task force revealed that a hijacker profile could be constructed from behavioral characteristics shared by past perpetrators. When used in conjunction with a FAA-developed magnetometer weapons screening device, the profile system offered a promising method of preventing potential hijackers from boarding aircraft. Eastern Air Lines began using the profiling system on October 15. By June 15, 1970, four U.S. air carriers employed the system.

Initially, FAA's new screening procedures added increased security. In the first three months of 1969 there had been 14 hijackings, but only three occurred in the same period in 1970. Not a single flight covered by FAA screening had been the subject of a hijacking attempt. But, Administrator Shaffer soon faced a new



1970, airport security sign

type of hijacker — individuals choosing destinations outside of the Americas and willing to kill to have their demands met.

On August 29, 1969, in the first hijacking of a U.S. aircraft outside of the Western Hemisphere, two terrorists seized control of a TWA 707 bound for Israel and diverted it to Syria. Once there, they deplaned the occupants and threw hand grenades into the cockpit. Two months later, on October 31, Rafael Minichiello, a U.S. Marine absent without leave, commandeered a TWA 707 bound for San Francisco and embarked on a 17-hour journey that ended in Rome, Italy. He was the first hijacker to force a crew to land and refuel repeatedly. On March 17, 1970, the first death in a domestic U.S. aircraft hijacking incident occurred when a hijacker shot and killed the copilot on an Eastern Air Lines shuttle en route from Newark to Boston. Although fatally wounded, the copilot still managed to shoot and severely wound the hijacker with the latter's gun. The aircraft's captain, himself wounded in both arms, landed the DC-9 safely in Boston.

In the wake of increased violence, FAA expanded its screening program. FAA selected New Orleans as a model for a more rigorous passenger screening system. On July 17, 1970, New Orleans' Moisant International Airport became the first U.S. airport to subject all passengers to the FAA-developed anti-hijacking screening system based

on a behavioral profile used in conjunction with a magnetometer. If a person identified as a possible risk could not satisfactorily resolve matters with airline personnel, the individual was investigated further by a U.S. marshal or deputy marshal.

In addition to deploying new security technologies to airports, FAA also strengthened its security organization. Administrator Shaffer dissolved the security task force created in 1969 and replaced it with a permanent organization, the Office of Air Transportation Security. The new office quickly found itself combating an even more violent breed of hijacker.



Dade County, Florida, deputy sheriffs check empty jetliners

Sky marshal training

of the Popular Front for the Liberation of Palestine hijacked four airliners over Europe, blew them up, and held many passengers hostage. The hijackers originally planned to seize two Israeli, one Swiss, and one U.S. aircraft, and take the planes to a level stretch of Jordanian desert dubbed "Revolution Airstrip." When the hijackers failed to seize the first Israeli plane, they hijacked a U.S. aircraft. Discovering the wide-body jet was too large to land at Revolution Airstrip, they ordered it to Cairo, where they blew it up after deplaning its occupants. Front members did succeed in boarding one Israeli

Between September 6-9, 1970, members

airliner, but their hijacking attempt failed when, upon landing in London, British authorities killed one hijacker and arrested the other.

The part of the original plan involving U.S. and Swiss airliners succeeded, and on September 6 these aircraft landed at Revolution Airstrip with all passengers. To gain bargaining power for the release of their member arrested in London, the Front hijacked a British airliner and forced it to land at Revolution Airstrip three days later. The Front blew up the three empty airliners on September 12 and freed all but six hostages on September 27. Those six were freed two days later, in return for the release of the hijacker under arrest in London and six other Front members held by the Swiss and West Germans.

In reaction to those hijackings, President Nixon announced, on September 11, a comprehensive antihijacking program that called for:

- Placement of armed guards, provided and specially trained by the U.S. Government, on American commercial airline flights;
- Extension, under DOT auspices, of electronic and other surveillance techniques by U.S. flag carriers to all gateway airports in the U.S., and in other countries wherever possible;
- Acceleration of efforts by U.S. federal agencies to develop security measures, including new methods for detecting weapons and explosives devices;
- Consultation between the U.S. State Department and other appropriate agencies and foreign carriers on anti-hijacking techniques; and
- Acceptance by all countries of a multilateral convention, to be considered at a conference held under the auspices of the International Civil Aviation Organization (ICAO), regarding the extradition or punishment of hijackers.

In addition, the president called on the international community to suspend airline service to countries refusing to extradite or punish hijackers involved in international blackmail. He stated that it was U.S. policy to hold nations that permitted the landing of a hijacked plane responsible for taking appropriate steps to protect the lives and property of U.S. citizens.

Two weeks later, the Departments of Justice and Transportation signed a memorandum of understanding dividing responsibilities for responding to hijackings. The FBI had jurisdiction when an aircraft was neither airborne nor moving on the runway for purposes of takeoff or landing. The pilot retained command at other times, and FAA's recommendations to the captain had precedence. A further agreement in December 1971 assigned the pilot the responsibility of signaling whether the aircraft should be disabled or stormed.

In October 1970 the Departments of Transportation and Treasury agreed that the Bureau of Customs would recruit and train a permanent force of customs security officers who would be assigned to FAA for service aboard commercial passenger flights. After rigorous training at Fort Belvoir, Virginia, 1,784 men and women became

Customs
Air Security
Officers,
more
familiarily
known as sky
marshals, on
December 23,
1970. By May
1971 they had
completely
replaced the
interim force



Sky marshals on the range in Quantico, Virginia

organized in accordance with the program announced by President Nixon on September 11, 1970. In June 1974 DOT announced the end to the joint Departments of Treasury and Transportation program.

Hoping to bring diplomatic pressure on nations to prevent hijackings, on December 16 the United States and 49 other nations signed the Convention for the Suppression of Unlawful Seizure of Aircraft (known as The Hague or Hijacking Convention) at a diplomatic conference held under ICAO auspices. The U.S. was an active participant in developing the convention, which declared the hijacking of civil aircraft to be an offense punishable by severe penalties. The convention obligated contracting states to extradite hijackers or to submit their cases to prosecutorial authorities. The U.S. Senate approved ratification on September 8, 1971, and the U.S. deposited its instruments of ratification on September 14. This completed the ten ratifications needed to bring the convention into force among participating states 30 days later, and it became effective on October 14, 1971.

On September 23, 1971, the United States and 29 other nations signed the Convention for the Suppression of Unlawful Acts Against

the Safety of Civil Aviation (known as the Sabotage or Montreal Convention) at an ICAO conference. This agreement was directed against offenders who commit acts of violence against persons aboard civil aircraft in flight, or who destroy or endanger such aircraft through means that include sabotage, interference with air navigation facilities, and communication of false information. It placed an obligation on contracting states to extradite such offenders

or submit their cases to prosecutorial authorities. The convention would go into force 30 days following deposit of instruments of ratification by ten of the original signatory states. The U.S. deposited its instruments of ratification on November 1, 1972, and the treaty went into force on January 26, 1973.

Despite a coordinated international effort, the air piracy problem persisted. On June 12, 1971, the first passenger death in a domestic hijacking incident occurred on a TWA aircraft bound from Albuquerque to New York. The hijacker forced his way aboard the Boeing 727 aircraft during a scheduled stop at Chicago's O'Hare International Airport, seized a stewardess, and demanded to be flown to Vietnam. A passenger was killed attempting to aid

the stewardess. When the medium-range aircraft landed at New York's Kennedy International Airport for substitution of a long-range aircraft, the hijacker was wounded and arrested.

In November 1971 the first in a series of hijackings involving extortion occurred when a passenger on a flight from Portland to Seattle successfully demanded \$200,000 and four parachutes,



Airport baggage screening

and then parachuted from the rear stairway of the Boeing 727. The hijacker — who used the name Dan Cooper, but became known as D. B. Cooper in the press — was never found. Another incident involving a demand for ransom and parachutes occurred on December 24, 1971, and 17 more extortion attempts on U.S. air carriers were made during the next six months.

In 1972 FAA worked to make its voluntary screening system mandatory. On February 2 the agency published a rule requiring scheduled air carriers, and certain commercial operators of large aircraft, to implement a passenger and baggage screening system acceptable to the administrator within four days. On the same day, at FAA request, the Federal Communications Commission (FCC) issued a notice informing broadcasters and FCC licensees that the Communications Act of 1934 prohibited unauthorized broadcast of FAA air-to-ground communications. This action followed instances in which FAA's communications were monitored and rebroadcast, seriously hampering the agency's efforts to control aerial piracy.



Security test

Another series of incidents between March 7-9, 1972, prompted new FAA security measures. On March 7 a bomb planted as part of an extortion plot against Trans World Airlines was discovered and defused

aboard an airliner at New York's Kennedy Airport. Two days later, another bomb damaged a TWA airliner parked at Las Vegas, and a third was found aboard a United Air Lines jet at Seattle. That

same day, President Nixon ordered into immediate effect a FAA rule published on March 7 that required scheduled air carriers and certain commercial operators of large aircraft to submit written security programs. The president's directive required the airlines to implement their programs immediately, and to submit them to FAA by May 8 for formal approval. Intended to prevent or deter unauthorized persons, baggage, or cargo from entering the carrier's aircraft, these measures also mandated the use of a passenger screening system and specified certain procedures to be followed in the event of a bomb or air piracy threat.

Maintaining the momentum of increased security actions, on March 15 a cabinet-level task force formed by President Nixon and chaired by Transportation Secretary Volpe approved the following steps:

- Increase numbers of personnel for FAA's Security Task Force.
- Deploy sky marshals from airborne duty to posts at major airports.
- Increase R&D funding for weapons and explosives detection systems.
- Use trained dogs for detection of explosives at major airports and assist in the training of additional dogs.
- Expedite prosecution of extortion and hijacking suspects.



Sky marshal training on airplane

These measures failed to prevent a new series of hijackings. On October 29, 1972, four fugitives killed a ticket agent and hijacked an Eastern Air Lines Boeing 727 at Houston, Texas, and forced it to fly to Cuba. This was followed by an even more sensational incident on November 10-12 when three wanted criminals hijacked a Southern Airways DC-9 at Birmingham, Alabama. During the following 29 hours, they flew to: Jackson, Mississippi; Cleveland, Ohio; Toronto, Ontario; Lexington, Kentucky; Chattanooga, Tennessee; Havana,

Cuba; Key West, Florida; and Orlando, Florida. In a desperate attempt to keep the DC-9 on the ground at Orlando, FBI agents shot out its tires. The hijackers responded by seriously wounding the copilot and ordering a takeoff. The pilot

If a passenger refused to consent to a search, he or she would not be permitted to board. The rule further required, beginning on February 5, 1973, that the nation's 531 air carrier airports have a law enforcement officer in the boarding area during the screening and boarding process. The critical difference between this rule and previous anti-hijacking measures was the universality of the new regulation. Previously, FAA had required air carriers to conduct a weapons scan of only those passengers who fit a hijacker profile — about one percent of the 500,000 passengers boarding airliners daily.

On August 5, 1974, President Nixon signed the Anti-Hijacking Act of 1974 into law. The act:

- Authorized the President to suspend air transportation between the United States and nations that aided terrorist groups who used the illegal seizure of aircraft as an instrument of policy.
- Empowered the Secretary of Transportation, with the approval of the Secretary of State, to impose sanctions against the carriers of nations that failed to maintain minimum security standards in the transportation of persons, property, and mail, as required by the Convention on International Civil Aviation.
- Required air carriers to refuse to carry persons unwilling to submit to personal search, and any article that a passenger did not allow to be inspected.
- Required FAA to keep passenger and baggage screening procedures in effect.
- Allowed FAA to use, for as long as needed, federal personnel, including FAA personnel, to supplement state, local, and private law enforcement officers in airport security programs. *[In anticipation of this responsibility, FAA drew upon resources of the defunct anti-hijacking and cargo security section of the office of air transportation security to establish a new unit, the civil aviation security service.]*



New regulations mandate enhanced screening

succeeded in clearing the runway and making a second and final landing in Havana. The four hijackers were initially imprisoned in Cuba, but were released. U.S. officials subsequently arrested all four, the last being sentenced in 1994.

On December 5 FAA issued a landmark emergency rule that required U.S. air carriers, beginning on January 5, 1973, to inspect all carry-on baggage for weapons or other dangerous objects and scan each passenger with a metal detector before boarding or, if a detector was not available, conduct a physical search, or pat down.

The passenger screening program and other precautionary measures proved effective in combating the hijacking menace. During calendar years 1973 and 1974, not a single airliner was hijacked in the United States.

Transitions

In January 1973 Richard Nixon began his second presidential term. On March 14, 1973, **ALEXANDER BUTTERFIELD [TERM: 03/14/73 – 03/31/75]** became the fifth FAA Administrator,



Administrator Alexander Butterfield

succeeding John Shaffer, whose resignation was one of many accepted by President Nixon in a reorganization of the Executive Branch. Butterfield's selection had been announced on December 19, 1972, and his nomination submitted to the Senate on January 4, 1973. Questions were raised about his eligibility, however, since he was a retired Air Force colonel

and the FAA Administrator was prohibited by law from having a military affiliation. When congressional exemption from this statute appeared unlikely, Butterfield resigned his Air Force commission. President Nixon resubmitted Butterfield's nomination to the Senate on February 26. The Senate confirmed him on March 12. A twenty year Air Force veteran, Butterfield had retired from the Air Force in 1969 to become deputy assistant to President Nixon.

Nixon's new appointees, including Administrator Butterfield, quickly became entwined in the Watergate scandal. *[Watergate became the general term for a series of political scandals during the re-election campaign and second presidential term Richard Nixon that began with five men being arrested after breaking and entering into the Democratic National Committee headquarters at the Watergate hotel complex in Washington, DC, on June 17, 1972.]* The Senate Select Committee on Presidential Campaign Activities, or Watergate Committee, began highly publicized hearings in May 1973. While Nixon compelled the resignations of some of his appointees during the inquiry, Butterfield remained FAA Administrator. Many former administration officials gave dramatic testimony at the hearings, held from May 17 to August 7. On July 16, during his testimony, Administrator Butterfield disclosed the existence of a White House audio taping system. After listening to the tapes, prosecutors had undeniable evidence, in Nixon's own words, that the president had obstructed justice and attempted to cover up the break-in.

Facing insurmountable evidence against him and probable impeachment hearings, on August 9, 1974, Richard Nixon resigned the presidency. Vice President Gerald Ford assumed the presidency, and on September 8, granted his predecessor a full and unconditional pardon for any crimes he might have committed as president. Alexander Butterfield remained as administrator until March 31, 1975. Deputy Administrator James Dow served as acting administrator until November 24, 1975, when **JOHN McLUCAS [TERM: 11/24/75 – 04/01/77]** became the sixth FAA Administrator. President Ford had



Administrator John McLucas

persuaded McLucas to give up his position as Secretary of the Air Force in favor of the FAA post. McLucas had a Ph.D. in physics and had held a number of technical management positions prior to entering government service.

PATCO

On March 17, 1973, negotiators signed the first labor contract between FAA and PATCO, the organization representing



Air traffic controllers on the job

controllers. Effective on April 4, the one-year agreement contained 56 articles that included provisions on a variety of issues including payroll deduction of union dues and “familiarization flights” by controllers in airline cockpits.

FAA and PATCO reached agreement on a two-year contract on May 7, 1975 (effective July 8). The contract’s 74 articles covered a range of items, such as an expansion of familiarization flight privileges, working conditions, and career enhancement. The new contract, however, proved ineffective in preventing disruptive PATCO-initiated actions. For example, on July 28-31, 1976, a slowdown by PATCO-affiliated air traffic controllers disrupted traffic around the country. The PATCO president ordered the slowdown to protest the U.S. Civil Service Commission’s delay in completing a pay reclassification study for controllers. The union also protested a Civil Service proposal to downgrade controllers at certain low-activity facilities. The slowdown ended when the Civil Service Commission agreed to reconsider its position and expedite the review, while Administrator McLucas publicly confirmed his support of upgrading controllers at certain facilities. FAA took no disciplinary action against PATCO.

On November 12, 1976, the U.S. Civil Service Commission, in a reversal of a position taken earlier, announced support for upgrading air traffic controller positions to higher pay grades at eight of the nation’s busiest air traffic control facilities. The commission also approved upgrading lower pay graded controllers at approximately 23 other installations, but insisted on downgradings at a few facilities. PATCO continued to demand better terms, backing its position with the threat of renewed slowdowns. On January 13, 1977, the commission dropped its insistence on downgradings and approved promotions at some 45 facilities.

Safety Concerns

In 1970 there were no passenger or air crew fatalities in U.S. scheduled domestic airline service. Two widely publicized charter accidents, however, raised a number safety concerns. On October 2 a chartered Martin 404 carrying members of the Wichita State University football team crashed near Silver Plume, Colorado,

1970s Major Aviation Accidents

June 6, 1971: A DC-9 airliner and a U.S. Marine Corps F-4B collided in midair over Duarte, California, killing all 49 occupants of the DC-9 and one of the two occupants of the F-4B.

September 4, 1971: An Alaska Airlines Boeing 727 struck a mountain slope while attempting a non-precision instrument landing approach to Juneau airport, killing all 111 persons aboard.

December 29, 1972: An Eastern Air Lines Lockheed L-1011 crashed in the Everglades northwest of Miami, Florida, killing 99 of the 176 persons aboard. Two survivors died later as a result of their injuries in this first fatal crash of a wide-body airliner.

December 31, 1972: The crash of a DC-7 on takeoff from San Juan, Puerto Rico, killed baseball star Roberto Clemente and four other persons on a relief mission to Nicaragua.

July 23, 1973: An Ozark Airlines Fairchild-Hiller 227B crashed 2.3 miles from St. Louis airport, killing 38 of the 44 persons aboard.

December 17, 1973: An Iberia Airlines DC-10 crashed on landing at Boston's Logan Airport, causing injuries but no fatalities.

January 30, 1974: A Pan American Boeing 707 crashed short of the runway during a rain storm at Pago Pago, American Samoa. Only ten of the 101 persons aboard escaped the post-crash fire. Six of these survivors died within nine days.

March 3, 1974: A McDonnell Douglas DC-10 wide-body airliner crashed shortly after takeoff from Paris, France, killing all 346 people on board in the worst air disaster up to that time.

July 31, 1974: A Delta Air Lines DC-9 crashed against a sea wall while making an instrument approach to Logan International Airport in Boston, Massachusetts, with the loss of 89 lives.

September 11, 1974: An Eastern Air Lines DC-9 crashed 3.3 miles short of a runway at Charlotte, North Carolina, while approaching through patchy fog. All but ten of the 82 persons aboard lost their lives.

December 1, 1974: A Northwest Airlines Boeing 727 crashed near Thiells, New York, killing all three persons aboard.

December 1, 1974: Approaching Dulles International Airport under conditions of poor visibility, a Trans World Airlines Boeing 727 descended too soon and crashed into a mountain near Berryville, Virginia, killing all 92 persons aboard.

June 24, 1975: An Eastern Air Lines 727 crashed into approach lights while attempting to land during a thunderstorm at New York's Kennedy airport, causing fatal injuries to 113 of the 124 persons aboard.

April 27, 1976: An American Airlines Boeing 727 crashed on landing at Charlotte Amalie on St. Thomas in the Virgin Islands, killing 37 of 88 persons aboard.

killing 32 of the 40 persons aboard. One month later, on November 14, Southern Airlines Flight 932 on approach to the airport in Huntington, West Virginia, crashed killing all 75 persons on board, including the Marshall University football team.

As the result of a series of high profile scheduled airline accidents beginning in 1971, FAA implemented a number of rules and

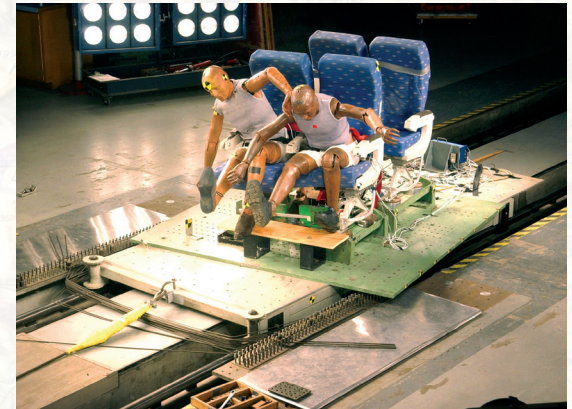


Safety improvements enhance passenger safety

initiated a number of new programs to enhance safety. For example, in the midst of growing concerns over midair collisions, on June 18, 1971, FAA announced a joint program with the military designed to minimize the number of military aircraft flying under VFR conditions. The purpose of the program was to bring military flights under the direct control

of FAA's air traffic control facilities to enhance the efficiency of the common civil-military airspace system and reduce the midair-collision hazard.

In August 1971 FAA expanded requirements for the installation of an anti-collision system of flashing aviation-red or aviation-white lights on aircraft for night operations. The agency mandated the system be installed on all powered U.S. civil aircraft with a standard airworthiness certificate. Later in the month, the agency required airline passengers and crew to fasten



Research and development helps mitigate injuries

safety belts during takeoff and landing. The rule excepted occupants of airships and children under two years if held by an adult. The new rule required the pilot in command to ensure that all persons aboard had been notified to fasten their safety belts prior to takeoff or landing.

New crashworthiness and passenger evacuation standards for transport category aircraft became effective in May 1972. The action upgraded requirements in areas that included: seats, berths, safety belts, and harnesses; stowage compartments; items in the passenger or crew compartments that might cause injury in turbulence or interfere with



New cockpit technologies

evacuation; cabin interior fire protection; emergency evacuation procedures; emergency exits (their arrangement, marking, lighting, and access); emergency lighting; briefing passengers before takeoff; and structural elements designed to minimize fire hazard due to fuel spillage in the event of partial or complete failure of the landing gear. In June 1973 FAA published a rule requiring aircraft in designated airspace to carry an improved radar beacon transponder that was capable of automatically reporting altitude and able to transmit identity codes. A new rule requiring air carriers and air taxi operators to establish training programs for personnel having responsibilities for the safe carriage and handling of hazardous cargo followed, as did a rule requiring air carriers, air travel clubs, and air taxi operators to have electronic public address systems and interphone systems in all aircraft equipped with more than 19 passenger seats.

November 1974 brought tougher new rules covering the training, testing, and certification of pilots and new certification and operating standards for FAA-approved pilot schools. As a result of the crash near Berryville, Virginia, on December 1, 1974, FAA mandated that all large turbojet and turboprop airliners install ground proximity warning system by December 1, 1975. This date was subsequently extended because of technical difficulties. As a result of the Transportation Safety Act, signed by President Ford on January 3, 1975, FAA prohibited air carriage of hazardous materials unless the container had been inspected.

On May 1, 1975, FAA instituted the aviation safety reporting program, designed to provide the agency with information on potentially unsafe conditions in the NAS. To encourage the reporting of violations, the program granted immunity from disciplinary action to pilots or controllers who filed a timely report. Changes to the program came in August 1975, when FAA and NASA signed an agreement under which NASA operated a third-party reporting system that guaranteed anonymity to

persons providing information about safety hazards and incidents. NASA agreed to: receive and process reports; delete information that would reveal the identity of the informants; analyze and interpret the data; and provide the results to FAA and the aviation community. NASA, however, directed information concerning criminal offenses directly to FAA and the Justice Department. The system became operational on April 15, 1976.



Increased pilot training requirements improve safety