President Ronald Reagan talks to reporters about the PATCO strike

Chapter 6: A System in Turmoil

On January 20, 1981, Ronald Reagan began his first presidential term. The resignation of Langhorne Bond as FAA Administrator became effective on this date. Three days later, Drew Lewis became Secretary of the U.S. Department of Transportation (DOT), the first of three to hold this position under President Reagan. Elizabeth Dole succeeded Lewis on February 7, 1983, and James Burnley became Secretary on December 3, 1987.

J. LYNN HELMS [TERM: 04/22/81 – 01/31/84] became the eighth FAA Administrator on April 22, 1981. He had received his flight training as part of the U.S. Navy's V-5 program during World War II, then entered the Marine Corps to serve as both a test pilot and instructor pilot. After leaving the Marine Corps with the rank of Lt. Colonel in 1956, he went to work as a design engineer for North American Aviation. In 1963 he joined the Bendix Corporation eventually becoming vice president. Helms then accepted the presidency of the Norden Division of United Aircraft in 1970. He joined Piper Aircraft Corporation in 1974, serving as president, chairman, and chief executive officer before retiring from the company in 1980.

Administrator J. Lynn Helms

DONALD ENGEN [TERM: 04/10/84 – 07/02/87] served President Reagan as the ninth FAA Administrator. He began flying with the Navy during World War II and participated in the air and sea battles that accompanied the recapture of the Philippines and attacks on Iwo Jima, Okinawa, and other Pacific Islands. After a brief return to civilian status following the war, Engen rejoined the Navy in 1946. He was deputy commander-in-chief of the U.S. Atlantic Command and U.S. Atlantic Fleet at the time of his retirement from the Navy in 1978. He served as general manager of the Piper Aircraft Corporation plant in Lakeland, Florida, from 1978-80, and then became a senior associate with Kentron, a consulting firm in Alexandria, Virginia. He was appointed a member of the National Transportation Safety Board (NTSB) in June 1982, and remained in that position until joining FAA.

Administrator Donald Engen

T. ALLAN McARTOR [TERM: 07/22/87 – 02/17/89] was the tenth FAA Administrator. He served as a fighter pilot in Vietnam, logging 200 combat missions and winning the Silver Star and Distinguished Flying Cross. McArtor flew with the Air Force Thunderbirds precision flying team from 1972 to 1974. He joined the Federal Express Corporation in 1979, and was senior vice president for telecommunications at the time of his selection to head FAA. He had also chaired the DOT Commercial Space Transportation Advisory Committee from June 1986 to June 1987.

Administrator T. Allan McArtor

PATCO Strikes

The labor contract between FAA and Professional Air Traffic Controllers Organization (PATCO) expired on March 15, 1981. In accordance with Article 75 of the contract, all of its provisions except one (immunity under the aviation safety reporting program) remained in force until a new contract was put in place. PATCO had submitted its bargaining proposals to FAA in early January 1981, and negotiations had begun the following month. After 37 negotiating sessions with FAA, however, PATCO representatives walked out of the contract talks, claiming that the agency was not responsive to their proposals. PATCO's proposals for a 32-hour work week and separate pay scale for controllers, then embodied in proposed legislation before Congress, faced opposition by the Office of Management and Budget. When formal contract talks ended on April 28, irregularly scheduled and informal talks began under the auspices of the Federal Mediation and Conciliation Service (FMCS).

On May 23, at its annual convention, PATCO set a June 21 deadline for reaching agreement on a new contract with FAA. The PATCO president said if an agreement could not be reached by that date, the union would poll its members for a strike vote. Newspapers quoted him as vowing that the "the skies will be silent" if FAA's negotiators did not "come to their senses." PATCO President Robert Poli threatened that a nationwide strike would begin on Monday, June 22.

Military controllers aid FAA during the strike

PATCO broke off informal talks on June 17, when it rejected a Reagan Administration contract proposal. The following day, the U.S. District Court rejected a PATCO motion to vacate the injunction restraining the union from engaging in illegal job actions or strikes. PATCO moved to have the injunction lifted on the grounds that it had been superceded by the Civil Service Reform Act of 1978, which gave the Federal Labor Relations Authority (FLRA) original jurisdiction in federal labor-management disputes.

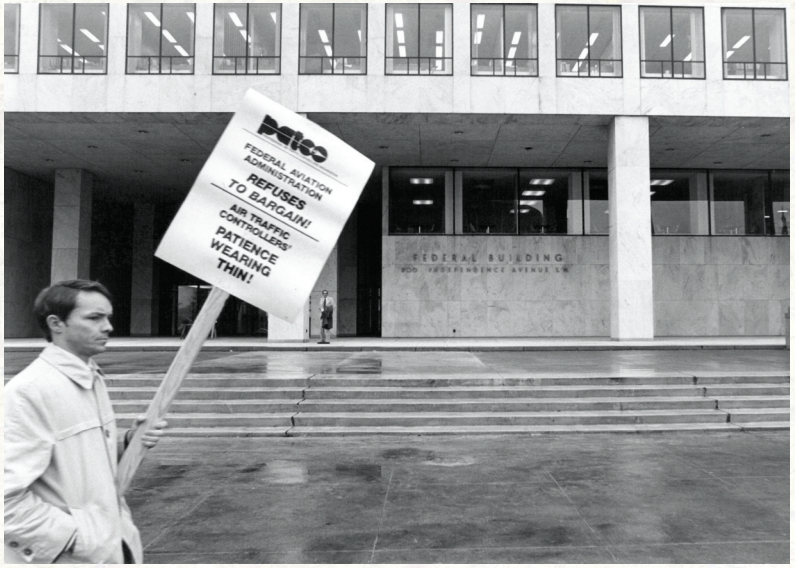
Secretary of Transportation Drew Lewis and Robert Poli went back to the bargaining table Friday evening, June 19, at the behest of Representative James Howard (D-NJ), chairman of the House Public Works Committee. The resumption of talks may have been prompted by a letter to PATCO from 36 U.S. Senators, stating that a strike by PATCO would do nothing to further the union's goals of increased pay and changes in working conditions. Federal mediator Kenneth Moffett joined the bargaining sessions, which took place at the offices of the FMCS and lasted more than 25 hours, with the last session running past 3:00 am, Monday, June 22.

The marathon bargaining session resulted in agreement on a tentative new contract. The agreement contained four key provisions, which the Reagan Administration agreed to recommend to Congress:

- A "responsibility" differential that would give controllers 42 hours pay for each normal 40-hour week worked.
- An increase in the night differential from 10 to 15 percent of base pay.
- The exclusion of overtime, night differential, and Sunday and holiday pay from the limitations of the federal pay cap.
- A retraining allowance equivalent to 14 weeks of base pay for controllers who became medically disqualified after five consecutive years of service at the journeyman level or above and who were ineligible for retirement or disability compensation.

The first-year cost of the total package, which included a cost-of-living raise of 4.8 percent due federal civil service employees in October, came to approximately $40 million or, on the average, $4,000 per controller per year. PATCO had been seeking a package that would have cost the government, initially, in excess of $700 million per year.

On July 2 PATCO's nine-member executive board recommended unanimously that union members reject the tentative contract. Robert Poli also voted to reject the contract, although he had stated that he was pleased with the settlement at the time of its negotiation. After a membership vote, on July 29, PATCO announced that its members rejected the tentative contract by a vote of 13,495 to 616. Two days later, the PATCO president announced at



PATCO controller on the picket line

a press conference in Washington, DC, that his union would begin a nationwide strike beginning on Monday, August 3, unless the government met PATCO's demands.

After the failure of last minute negotiations, which began 2:00 pm Sunday, August 2, and continued, with one break, past 2:00 am on August 3, the union carried out its threat. On August 3 approximately 12,300 members of the 15,000-member PATCO

went on strike, beginning at 7:00 am eastern standard time, grounding approximately 35 percent of the nation's 14,200 daily commercial flights. Approximately four hours after the strike began, President Reagan, at an impromptu news conference, issued the strikers a firm ultimatum — return to work within 48 hours or face permanent dismissal.

Supervisors take over in the Chicago O'Hare airport tower

The Reagan Administration moved swiftly on three fronts — civil, criminal, and administrative — to bring the full force of the law to bear on the strikers. In a series of legal steps, federal officials:

- Asked FLRA to revoke the certification of PATCO as the bargaining agent for the 17,200 controllers and controller staff members. *[FLRA revoked the exclusive recognition status of PATCO on October 22. Following a temporary stay by a federal appeals court, the revocation became effective on October 27. In a subsequent appeal, on June 11, 1982, a federal appeals court chose not to vacate the earlier decision to uphold the revocation order.]*
- Moved to impound the union's $3.5 million strike fund.
- Filed criminal complaints in federal courts in eleven cities against twenty-two PATCO officials.
- Sought restraining orders against the strikers in thirty-three courts.

Even before the 7:00 am walkout, the U.S. District Court for the District of Columbia signed an order directing the controllers to return to work. Late in the evening on August 3, another judge of the same court found the union in contempt for failing to obey the first order and imposed an accelerating schedule of fines totaling $4.75 million if the controllers failed to report to work *[$250,000 for Tuesday, August 4; $500,000 for Wednesday; $1 million a day for the next four days].* That judge also fined the PATCO president $1,000 a day for each day the strike continued, through Sunday, August 9. Approximately 875 controllers returned to work during the 48 hour grace period granted. After expiration of the grace period, FAA fired approximately 11,400 controllers. On December 9, 1981, President Reagan rescinded a three-year prohibition of any federal employment of controllers dismissed for participation in the PATCO strike; however, the fired controllers were still barred from employment with FAA. Most of those fired appealed the action, and FAA eventually reinstated 440 as a result of their appeals.

The strike and dismissals drastically curtailed FAA's controller workforce. The firings reduced the number of controllers at the full performance or developmental levels from about 16,375 to about 4,200. To keep the airways open, approximately 3,000 air traffic controller supervisory personnel worked at controlling traffic. FAA assigned assistants to support the controllers, and accelerated the hiring and training of new air traffic personnel. Military controllers arrived at FAA facilities soon after the strike began, and about 800 were ultimately assigned to the agency. On September 4 FAA announced it would hire approximately 1,500 temporary employees to assist in replacing air traffic controllers fired for striking. The

temporary employees would not control traffic, but would perform duties related to flight strip distribution and other controller support functions. The combined force proved sufficiently large to handle traffic without activating the national air traffic control contingency plan, which called for FAA to establish rigid, severely curtailed airline schedules and to prescribe routes and altitudes.

The day the strike began, FAA adopted Special Federal Aviation Regulation 44, establishing provisions for implementing an interim air traffic control operations plan. That plan, developed by former FAA Administrator Langhorne Bond, allowed FAA, among other things, to limit the number of aircraft in the national airspace system (NAS). On August 5 the agency implemented a plan dubbed "Flow

Airport congestion grows

Control 50," whereby it required air carriers to cancel approximately 50 percent of their scheduled peak-hour flights at 22 major airports. FAA maintained en route horizontal spacing between aircraft under instrument flight rules (IFR) of up to 30 miles. The agency kept aircraft on the ground, as necessary, to maintain this spacing. FAA gave priority to medical emergency flights, presidential flights, flights transporting critical FAA employees, and flights dictated by military necessity. General aviation flights operated under the severest restrictions. Aircraft with a gross takeoff weight of 12,500

General aviation remained largely grounded during the strike

pounds or less were prohibited from flying under IFR. Aircraft flying under visual flight rules were prohibited from entering terminal control areas (TCAs). Other general aviation aircraft were served, as conditions permitted, on a first-come-first-served basis.

PATCO President Robert Poli resigned on December 31, and the newly elected president, Gary Eads assumed his duties on January 1, 1982. Seven months later, on July 2, 1982, PATCO filed a request for liquidation under Chapter 7 of the Federal Bankruptcy Act. At that time, the union had about $5 million in assets but owed $40 million, including $33.4 million to the airlines for violating a 1970 federal

court anti-strike injunction. The controllers remained without a union until June 19, 1987, when the FLRA certified the National Air Traffic Controllers Association as the exclusive representative of terminal and center controllers.

During this time, FAA electronics technicians unionized. On December 29, 1981, FLRA certified the Professional Airway Systems Specialists (PASS) as the exclusive representative of the technicians. PASS had defeated the Federal Aviation Science and Technological Association (FASTA) in a July election, but a protest by FASTA delayed certification of PASS. FAA and PASS concluded their first national labor agreement during fiscal year 1984.

Modernization

The new competitive environment created by airline deregulation resulted in greater demand for service, a change in flying routes as airlines formed hubs at major cities, and growing congestion in the aviation system. Congestion resulted from the interaction of many factors. The combination of fare decreases and hubbing led to increased air travel, while the limitations of the air traffic control equipment and long lead times for airport expansion held back increases in system capacity.

Deregulation brings the advent of "hubbing"

Aviation system disruptions in the aftermath of the PATCO strike led many in FAA to realize the need for a fully automated air traffic control system. Such a system could help compensate for increasing system complexity and lessen controller workload. Although it had been fielding new technology incrementally as new tools and resources became available, during the strike the agency realized it needed a systematic, long-term plan for modernization.

On January 28, 1982, Administrator Helms publicly released the first annual National Airspace System Plan (commonly known as the Brown Book), a comprehensive 20-year blueprint for a state-of-the-art traffic control and air navigation system to accommodate projected growth in air travel over the next 20 years. *[The 450-page document had been printed the previous month and bore the date December 1981.]* The plan spelled out specific improvements to be made to facilities and equipment to meet the projected demands of air transportation. Key elements of the plan included:

- *Computers:* FAA would first replace the IBM 9020 computers at the air route traffic control centers (ARTCCs) with more powerful systems that could use existing software packages. The agency would then proceed with development of new software as well as new consoles and displays known as "sector suites."
- *Facility consolidation:* ARTCCs and terminal radar control rooms would be consolidated from approximately 200 into about 60 by the year 2000. Flight service stations would be consolidated from about 300 into 61 automated facilities.
- *Radar:* a new secondary radar system would interrogate aircraft transponders on an individual basis, paving the way for automatic data link air-ground communications. This Mode S equipment ("S" for "selective address"), in combination with a new generation of Doppler weather radar, would also permit the replacement of the existing primary en route radar system. Primary radar would

be retained in terminal areas, however, and be improved with the addition of a separate weather channel.

- *Weather services:* would be upgraded by such means as direct pilot access to computer weather data via remote terminals or touchtone telephones. Automated sensors at airports would generate radio broadcasts on surface conditions, improving safety and allowing lower weather minimums for landing.
- *Microwave Landing System (MLS):* full production procurement was to be initiated in fiscal year 1983, with over 1,250 systems to be in place before century's end. FAA expected the new equipment to provide precision guidance over a much broader area than the existing Instrument Landing Systems (ILS), thus allowing greater operational flexibility.

Improved weather forecasting reduces delay and enhances safety

Authorization to fund modernization came with the Tax Equity and Fiscal Responsibility Act (Public Law 97-248) signed by President Reagan on September 3, 1982. The act raised the airline passenger ticket tax from five to eight percent, increased the general aviation gasoline tax from 4¢ to 12¢ per gallon, levied a jet fuel tax of 14¢

New taxes fund airport improvements

per gallon, and reimposed the five percent air cargo tax and the $3 international departure fee. These taxes were earmarked as renewed funding for the Airport and Airway Trust Fund, which had received no tax revenues since September 30, 1980. Title V of the tax bill, designated the Airport and Airway Improvement Act of 1982, authorized FAA to use a total of $6.327 billion from the Trust Fund for airway facilities and equipment over the six years beginning with fiscal 1982. In addition, $1.169 billion from the Trust Fund was authorized for the agency's research, engineering, and development activities during the same six years. The act also reestablished FAA's

airport grants program for development and noise compatibility projects. Formerly known as the Airport Development Aid Program, this function was now renamed the Airport Improvement Program.

With approved funding, FAA moved quickly to acquire new systems. In December FAA upgraded the computer at its Central Flow Control Facility at its Washington headquarters. Physically located at the Technical Center in Atlantic City, New Jersey, the new IBM 4341 computer was connected by landline to terminals used by Central Flow personnel at headquarters. The IBM 4341 had 14 times more memory and was 70 percent faster than the IBM 9020A it replaced. In addition, it allowed two-way data communication between the Flow Control Facility and air route control centers (ARTCCs). Controllers used the computer to monitor the number of aircraft in flight, as well as their destinations and times of arrival, as part of Central Flow's mission of keeping air traffic running smoothly.

Acquisition of new technologies improves flight safety

In September 1984 FAA announced the award of a construction contract to expand the Seattle ARTCC, the first in a program to expand all 20 en route centers in the 48 contiguous states. The construction would allow the facilities to accommodate more sophisticated computers and radar displays being developed under the advanced automation program. A contract award for design of the Oceanic Display and Planning System (ODAPS) quickly followed. ODAPS automatically provided controllers with flight data for aircraft flying in oceanic sectors, thus eliminating time-consuming procedures involving use of flight strips and repeated voice communications.

FAA also announced a contract for ground stations for the new Mode S radar beacon system, a secondary radar system employing advanced ground sensors and radar beacon transponders aboard aircraft. Two corporations participated in the joint contract to produce 78 of the stations, with an option for another 59 units. The discrete address capability of the new system enabled controllers to interrogate aircraft individually and selectively determine their position, identity, and altitude, without using voice communications. This eliminated the overlapping and garbled signals that sometimes proved problematic in busy terminal areas.

FAA awarded a contract to IBM for replacement of the IBM 9020 computers at the nation's 20 ARTCCs in July 1985 as part of the agency's advanced automation program. The new system, designated the host computer system, would provide greater speed, reliability, and storage capacity. The system consisted of two units, one serving as the primary processor and the other providing support and backup. FAA commissioned the first host computer at the Seattle ARTCC on May 29, 1987, and commissioned the last host system at the Salt Lake City ARTCC on June 23, 1988.

In addition to installing the host systems at the ARTCCs, IBM agreed to supply the system to teams working on the other major element of the advanced automation program, the Advanced Automation System (AAS). Under a pair of contracts announced in August 1984, IBM and Hughes Aircraft Company were competing to produce the best AAS design. Among the key elements of AAS were controller work stations, called "sector suites," that

would incorporate new display, communications, and processing capabilities. AAS would also include new computer hardware and software to bring the air traffic control system to higher levels of automation. Once the full AAS system was operational, FAA planned to integrate en route and terminal radar control services into 23 area control facilities. Future enhancements to AAS included an automated en route air traffic control function that automatically examined aircraft flight plans to detect and resolve potential conflicts. *[On July 26, 1988, FAA announced it had awarded IBM a $3.55 billion contract to develop, deploy, and service AAS. The announcement ended almost four years of competition between IBM and Hughes Aircraft Company.]*

Increasing Security

While it worked to rebuild the air traffic control system in the aftermath of the PATCO strike, FAA faced a number of other challenges, including growing security concerns. The agency had previously adopted new security rules in January 1981 that subjected commuter aircraft with a seating capacity of 60 or more passengers to the same anti-hijacking programs as the aircraft of larger airlines. In September Federal Aviation Regulation Part 108, a new rule on airline security, went into effect. The regulation levied airline security requirements according to the perceived threat facing different types of operations and sizes of aircraft, and established security safeguards appropriate to the various types of commercial passenger operations.

A new wave of aviation piracy began in mid-1983. On May 1 a hijacker succeeded in reaching Havana by locking himself in a lavatory during an airline flight and issuing notes threatening to blow up the aircraft. The incident began a renewed upsurge of hijackings to Cuba, many perpetuated by Mariel boat lift refugees who had come to the United States by boat between April 15 and October 31, 1980. By September 22 hijackers had diverted ten additional airliners to Cuba, prompting FAA to increase security measures at airports in selected areas. Hijackings to Cuba began to decline in the last quarter of 1983, although three such diversions took place in 1984.

As hijackings to Cuba decreased, international terrorism in the sky increased. Four Arab hijackers diverted a Kuwait Air Airbus A-310 to Iran on December 4, 1984, where they murdered two

Ticket agents serve as the first line of aviation security

American passengers and committed other brutalities while demanding the release of prisoners held in Kuwait. The hijackers released 153 of their hostages in several groups, and Iranian forces freed the remainder when they stormed the aircraft on December 9. The hijacking signaled an increase in terrorist seizures of foreign airliners.

On June 14, 1985, two Lebanese Shiite Muslims hijacked a TWA Boeing 727 departing Athens and diverted it to Beirut, where additional hijackers joined them. During a two-week confrontation, they demanded the release of Shiite prisoners held by Israel. The hijackers murdered one passenger, a U.S. Navy diver. They released the other 155 hostages (including 39 Americans) in stages, the last being freed on June 30. Lebanese authorities held the aircraft in Beirut until August 16. In response to the hijacking, President Ronald Reagan directed the Secretary of Transportation, in cooperation with the Secretary of State, to explore expansion of the armed sky marshal program for use on U.S. air carrier international flights.

An Air India Boeing 747 crashed into the North Atlantic on June 23 during a flight from Montreal to London, killing all 329 persons aboard. Investigation reports released the following year concluded that a bomb contained in luggage in the forward cargo hold destroyed the aircraft. In July 1992 Indian authorities arrested a Sikh extremist allegedly involved in the bombing.

Reconstructing the Air India aircraft

In November 1985 an unusually bloody hijacking began when three men seized control of an Egyptair Boeing 737 with 98 persons aboard shortly after takeoff from Athens. In a midair gunfight, one hijacker was killed and an Egyptian security guard and two flight attendants wounded. The hijackers demanded to fly to Libya or Tunisia, but agreed to refuel at Malta. In an attempt to force Maltese authorities to supply the fuel, the hijackers shot five hostages, killing two of them, including an American woman. After 22 hours of negotiation, an Egyptian military force stormed the plane. During the rescue action, 57 persons died and about 30 others were injured.

Near-simultaneous Arab terrorist attacks on airports in Rome and Vienna on December 27 caused the death of 20 persons, including four terrorists, and injured approximately 120. Five of the victims killed were U.S. citizens. The attacks centered on the check-in counters of the Israeli airline El Al. Libyan leader Muammar Qaddafi praised the terrorists, thus contributing to tensions between his nation and the United States.

TWA Captain John Testrake with hijacker in Beirut

The TWA hijacking in June and an upsurge in Middle East terrorism prompted a series of U.S. actions:

- On June 27, 1985, Transportation Secretary Elizabeth Dole urged the International Civil Aviation Organization (ICAO) to act immediately to enhance airport security. The

ICAO Council met on an accelerated schedule, and on December 19 adopted amendments strengthening international security standards and recommended practices.

- On July 1 President Reagan suspended airline travel between U.S. and Lebanon.
- During July FAA issued an emergency regulatory amendment requiring airlines to carry Federal Air Marshals on certain flights. Eight days later, the agency issued another emergency rule that required airlines to expand security training for crew members and to provide a ground security coordinator and an in-flight security coordinator for every flight.
- Between mid-August and early November, FAA personnel assisted by law enforcement officers from other agencies inspected U.S. air carrier security procedures at 79 foreign airports.
- FAA also issued a number of emergency amendments to the agency-approved security programs of both airlines and airport operators.
- On August 8 President Reagan signed the International Security and Development Cooperation Act of 1985 (Public Law 99-83). The Act authorized the use of $5 million from the Airport and Airway Trust and for research on and development of airport security devices and explosives detection techniques. It also mandated a system for conducting security assessments at foreign airports, and authorized Federal Air Marshals as a permanent FAA workforce. FAA reorganized its office of civil aviation security to reflect its expanded responsibilities under the Act, creating an international civil aviation security division and an intelligence division.

A new wave of international incidents began in 1986. On April 2 a bomb hidden under a seat cushion exploded aboard a TWA Boeing 727 on approach to Athens, Greece, creating a hole in the fuselage four feet in diameter. The blast killed four passengers and injured nine others, but the aircraft landed safely.

On September 5, at Karachi, Pakistan, four men dressed as security guards stormed a Pan American Boeing 747. The flight crew escaped, but the four terrorists demanded a crew to fly them to Cyprus. They killed an American passenger during the ensuing 17 hour negotiations. When the lights aboard the aircraft failed, the terrorists began a massacre, killing 22 persons and injuring 125 before being arrested.

Thermal neutron activation explosives detection system

As a result of continued security incidents, beginning December 19, 1987, FAA required a positive baggage/passenger match on all international flights by U.S. airlines. FAA had placed the same requirement on selected international flights in the summer of 1985. On November 7, 1988, the agency announced award of a contract for five operational models of a new thermal neutron activation (TNA) explosives detection system. The TNA device measured the gamma rays produced by energy neutrons

Federal Air Marshal training

passed through luggage and cargo and triggered an alarm when components of explosives were detected. FAA had first become involved in TNA research in 1976. After testing a prototype TNA device, the agency awarded competitive design contracts in September 1985 and began testing a prototype system at San Francisco International Airport in June 1987.

On December 21 an explosion destroyed Pan American World Airways Flight 103 near Lockerbie, Scotland, killing all 259 persons aboard and 11 on the ground. The Boeing 747 had been bound for New York Kennedy from London Heathrow. Investigators later concluded that a bomb concealed inside a radio-cassette player and loaded into a forward luggage compartment in Frankfurt had caused the explosion. The attack had been planned by the Libyan government and carried out by Libyan intelligence agents. FAA quickly began an inspection of Pan American's security procedures at Heathrow and Frankfurt airports, and later proposed $630,000 in civil penalties against the airline for alleged violations of security regulations.

Eight days after the Lockerbie tragedy, FAA announced new security measures for U.S. carriers at all airports in Europe and the Middle East. These included requirements that the airlines X-ray or physically search all checked baggage, conduct additional random checks of passengers and baggage, and achieve a positive match of passengers and their baggage to keep unaccompanied bags off airplanes. FAA also ordered a sixth TNA device and accelerated the TNA delivery schedule.

Bombing of Pan Am 103 results in increased security measures

In early January 1989 FAA issued a rule requiring airport operators to supplement their procedures for limiting entry into secure areas by installing a computer-controlled access system, or a similar approved system. FAA followed this with a new rule in March that required foreign air carriers that land or takeoff in the U.S. to submit a written security program to the agency. It also adopted a mandatory minimum fine of $1,000 for passengers trying to take guns through airport screening positions. FAA announced in September it would begin requiring airlines to install explosives detection systems to screen checked baggage for international flights, with about 40 U.S. and foreign airports targeted for initial implementation. That same day, operational testing of the first of six FAA-funded TNA explosive detection systems began at New York Kennedy airport. Subsequently, FAA conducted TNA demonstrations at several other airports.

Pan Am 103 being reconstructed

Safety Improvements

Administrator Helms took over FAA at a time when the agency's new safety rules and procedures and technological improvements began to prove successful. In fact, December 31, 1981, marked completion of the second consecutive calendar year with no fatal airplane crashes by scheduled air carriers operating under Federal Aviation Regulations Part 121. This unprecedented two-year safety record, however, would soon be broken.

On January 13, 1982, a Boeing 737 operated by Air Florida crashed near Washington National Airport shortly after taking off during snowfall. The aircraft hit a bridge, killing four persons in vehicles, and plunged into the Potomac River. Of the 79 persons aboard the jet, only four passengers and one flight attendant survived. Ten days later, in a night landing too far down an icy runway at Boston's Logan airport, a World Airways DC-10 slid over the edge of a seawall and into shallow harbor water. The nose section separated from the fuselage, and two passengers seated at the separation point were later identified as missing and presumed drowned.

Tail of the Air Florida 737 in the Potomac River

As a result of these accidents, FAA and the aviation industry took a number of actions to increase awareness of cold weather hazards and the proper response to them. The creation of a Joint System Program Office representing the National Weather Service, FAA, and the Air Force led to the award of two competitive contracts to develop pre-production models of the Next Generation Weather Radar (NEXRAD). These initial contracts remained in effect until July 1986, when the FAA awarded a production contract for the system. NEXRAD had the ability to see inside storms and measure the velocity and direction of wind-driven precipitation and other particles suspended in the air. After testing the Hazardous Inflight Weather Advisory Service in the areas of the Jacksonville and Miami ARTCCs, FAA adopted it for national implementation. The system provided continuous broadcast of information on dangerous weather. By September 1989 the agency had completed delivery of sufficient equipment to provide nationwide coverage at or above 4,000 feet.

New radars improve weather forecasting

A third 1982 accident focused FAA attention on another weather phenomenon. On July 9 a Pan American Boeing 727 crashed shortly after takeoff from New Orleans International Airport, killing all 145 aboard and eight persons on the ground. NTSB listed the accident's probable cause as the airplane's encounter with microburst-induced wind shear, a phenomenon that imposed a downdraft accompanied by a decreasing headwind. As a contributory factor, board members listed the limited ability of the

current Low Level Wind Shear Alert System (LLWAS) to provide definitive guidance for controllers and pilots in avoiding the hazard.

Concerned over the accident, Congress passed legislation in December requiring FAA to contract with the National Academy of Sciences for a study of the wind shear hazard. The resulting

Meteorologists at the National Aviation Weather Center provide weather forecasts for the aviation community

report, completed by the Academy's National Research Council in September 1983, urged FAA to establish an integrated wind shear program to address all aspects of the problem. The recommendations included the improvement and wider use of LLWAS, which the investigators considered the only detection system available in the near term for operational use. In October 1983 FAA ordered 51 additional LLWAS systems.

A series of accidents in 1983 resulted in a number of new FAA safety initiatives. On June 2 an in-flight fire aboard an Air Canada DC-9 filled the cabin with smoke and prompted an emergency landing at Greater Cincinnati airport in Covington, Kentucky. A flash fire enveloped the aircraft interior about 60 to 90 seconds after the exits were opened, killing 23 of the 46 persons aboard. On October 11 an Air Illinois accident near Pinckneyville, Illinois, caused by the loss of electrical power, killed all ten persons aboard. In December, attempting to takeoff at Anchorage, a Korean Airlines cargo DC-10 collided on the ground with a Piper Navajo operated as a commuter by SouthCentral Air. Disoriented in heavy fog, the DC-10 captain had selected the wrong runway. The accident caused no fatalities, but seriously injured three persons and destroyed both aircraft.

On March 4, 1984, FAA began a 90-day national air transportation inspection (NATI) of 237 major and commuter airlines and 25 air transportation support organizations. The NATI began with "white glove" examinations to identify deficiencies that became the focus of in-depth inspections during the second phase of the program, which ran April 7-June 5. In December DOT announced that the NATI had shown 95 percent of the airlines to be in compliance with safety rules. Sixteen airlines, however, revealed deficiencies sufficient to warrant revocation or voluntary surrender of their certificates, suspension or curtailment of their operations, aircraft groundings, or withdrawal of pilots from service for a period of time. *[On February 10, 1986, FAA formally established the National Aviation Safety Inspection Program to continue, on a more systematic basis, the kind of in-depth inspections begun under the NATI.]*

In addition, FAA began a Safety Activity Functional Evaluation (Project SAFE), a proactive review of the agency's safety inspection program. During the course of the project, its scope broadened from an initial focus on inspectors to a comprehensive review of the flight standards function. The findings of the review, announced in November 1985, included a plan for revamping the safety inspection program. The plan, portions of which had already been implemented, included increased standardization of inspection

practices and interpretation of rules, a high-priority effort to update safety regulations, increased use of the automated Aviation Safety Analysis System, and strong management oversight.

Following the successful NATI, in June 1984 Transportation Secretary Dole announced that FAA would conduct a General Aviation Safety Audit. Beginning on July 22 the inspections focused on: pilot schools, instructors, and examiners; repair stations; non-airline operators of large aircraft; older large jet aircraft scheduled to be phased out because of failure to meet the new noise standards; and on-demand air taxis. During the program, a number of operators voluntarily surrendered their certificates. FAA submitted the results of the audit to DOT between August 1985 and February 1986. Only four percent of findings were reported as significant unsatisfactory conditions, many of which involved air taxis. As a result of the audit, FAA revised its guidelines to include stepped-up inspections of air taxis, repair stations, and such operators of large aircraft as travel clubs, contract cargo carriers, and corporations with executive fleets.

General aviation safety becomes a higher priority

To increase the survival chances of airline passengers encountering fire and smoke, FAA published two new rules on October 26, 1984. One rule called for the installation, within three years, of seat cushions possessing an outer layer of highly fire-resistant material. FAA research showed that the cushions would provide as much as 40 additional seconds before flashover, the deadly ignition of accumulated vapors. The requirement applied to operators of aircraft weighing 12,500 pounds or more and having over 29 seats. The second rule required emergency escape path marking at or near floor level that would provide evacuation guidance even when all sources of illumination more than four feet above the cabin aisle floor were totally obscured by smoke. With the exception of aircraft types having been certified before 1958, all airliners operated by major lines were required to have such lighting within two years.

As part of a joint program to increase aircraft safety, FAA and NASA conducted a controlled impact demonstration (CID) in December 1984. Researchers remotely piloted a Boeing 720 to a prepared crash site at Edwards Air Force Base, California. The aircraft carried instrumented test dummies, high-speed cameras, and more than 350 sensors to transmit data to ground recorders. The project involved many experiments on the crash behavior of the aircraft's structure and of internal features such as seats, seat belts and harnesses, storage compartments, and galleys. Researchers also tested fire-blocking seat cushion layers, fire-resistant windows, cockpit voice recorders,

and flight data recorders. In addition, the aircraft's fuel tanks carried anti-misting kerosene (AMK), an experimental fuel designed to prevent or minimize the fireball that sometimes resulted when fuel spilled from a ruptured tank formed a volatile mist and ignited.

At the impact site, eight steel wing cutters were installed to ensure fuel would spill from the tanks. Touching down 300 feet short of the cutters with its left wing low, the aircraft slid forward at an angle ensuring that the first cutter would slash into the right inboard engine before ripping open the wing tank. The resulting spill began with non-AMK fuel from the engine, which ignited instantly and touched off the AMK fuel gushing from the tank. A spectacular fireball resulted. The use of AMK reduced the heat of the fire, and an estimated 20 percent of the passengers would probably have escaped had the aircraft contained human occupants. The AMK test proved disappointing, however, and in September 1985 FAA announced that it had dropped plans to require airline use of the special fuel. Despite this, other experiments conducted as part of the CID produced a wealth of useful information.

1984, controlled impact demonstration

FAA fire research led to a March 29, 1985, rule to improve cabin fire protection for passengers aboard aircraft operated by major airlines. The rule required that each lavatory be equipped with a smoke detector, or equivalent, and that each lavatory trash receptacle be equipped with an automatic fire extinguisher. It also increased the number of hand fire extinguishers required in the cabins of aircraft with more than 60 seats, and specified that at least two of these use Halon 1211 or an equivalent extinguishing agent. Additional fire safety measures came in May 1986, when FAA established new fire test requirements for cargo or baggage compartments in future transport aircraft. A July rule set stricter flammability standards for materials used in cabins of existing and future airliners with 20 or more passenger seats. The new rule required use of fire resistant and slower-burning materials for cabin sidewalls, ceilings, partitions, storage bins, galleys, and other interior structures. In August 1988 FAA refined fire test procedures and apparatus and set a new requirement for smoke emissions testing. The agency expected the new flammability standards would also lessen the release of toxic gas during a fire.

Weather re-emerged as a topic of concern when a Delta Air Lines aircraft encountered wind shear and crashed during a landing approach to Dallas-Fort Worth International Airport in August 1985. The accident killed 134 of the 163 persons aboard and one person on the ground. The fact that wind shear did not reach the sensors of the LLWAS until after the crash demonstrated the system's limitations. On November 27 FAA announced the award of a contract for development of a comprehensive wind shear training program for pilots. The agency received the completed program in February 1987 and distributed it to industry.

FAA also developed an Integrated Wind Shear Program plan. In addition to better pilot training, the plan featured development of: improved ground-based detectors, including: enhanced LLWAS; NEXRAD; Terminal Doppler Weather Radar, also known as TDWR; and sensors for airborne detection systems using microwave Doppler, laser, or infrared radiometer technology. FAA issued a rule in September 1988 requiring that all turbine-powered airliners seating 30 passengers or more carry equipment to warn pilots who are about to encounter low-altitude wind shear and provide them with information needed to escape safely. Two months later, in November 1988, FAA announced it had awarded a contract to Raytheon for 47 TDWR systems.

A year after the Delta crash in Texas, a DC-9 from Mexico and a Piper PA-28 collided in clear sky over Cerritos, California. The Piper had inadvertently made an unauthorized entry into the Los Angeles terminal control area, and its radar return was not observed by the controller providing service to the Mexican flight. The accident killed 82 persons – all 64 aboard the DC-9, all three aboard the Piper, and 15 on the ground. The Cerritos accident was the first midair collision to occur within a TCA. On September 15, 1986, FAA Administrator Donald Engen appointed a special task force to study ways to better protect the TCAs. On October 27 the agency announced plans to implement the group's 40 recommendations, which included a minimum 60-day license suspension for pilots violating TCA boundaries, expanded requirements for altitude encoding transponders, and action to simplify and standardize the design of TCAs.

The Cerritos accident also led to a 1987 FAA mandate for aircraft to use a traffic alert and collision avoidance system (TCAS). The rule continued a requirement that aircraft be equipped with a transponder for operation in TCAs and in the airspace of the 48 contiguous states above 12,500 feet above ground level. The requirement for automatic pressure altitude reporting (Mode C) equipment was extended to include Group II TCAs effective December 1, 1987. The rule also contained provisions intended to provide for transition from the older Air Traffic Control Radar Beacon System (ATCRBS) transponders to Mode S transponders. All transponders newly installed in U.S.-registered aircraft were required to be Mode S transponders after January 1, 1992, a deadline that was subsequently extended to July 1, 1992. In January 1989 FAA published a rule requiring the TCAS II on all airliners with more than 30 passenger seats operating in U.S. airspace. The airlines were to phase in TCAS II by December 30, 1991. On April 9, 1990, however, FAA extended the TCAS II compliance schedule completion date to December 30, 1993. The rule also required turbine-powered commuter aircraft with 10 to 30 passenger seats to install the simpler TCAS I by February 9, 1995, a deadline later extended to December 31, 1995.

The TCAS system was an evolutionary improvement of the beacon collision avoidance system (BCAS) that the agency had been developing. Like BCAS, TCAS worked in conjunction with the ATCRBS transponder already in wide use. It was also compatible with the next-generation transponder, originally designated the Discrete Address Beacon System that later became known as Mode S. TCAS I, intended for general aviation use, simply alerted the pilot to

Cerritos, California, accident scene

the proximity of another aircraft carrying TCAS I or a conventional ATCRBS transponder. TCAS II provided more sophisticated advisories, including data on range and bearing of transponder-equipped aircraft. When the transponder aboard the threat aircraft had altitude-reporting capability, TCAS II advisories also included altitude data. In the case of two aircraft equipped with TCAS II, coordinated advisories were provided.

Aircraft cockpit with TCAS II and other safety technologies

FAA Administrator T. Allan McArtor announced a new safety plan during his public swearing in ceremony on July 27, 1987. His safety initiative, dubbed Impact 88, focused on airline accountability, aircrew performance, airspace capacity, advanced technology, aviation awareness, air transportation security, airport development, and agency effectiveness. Impact 88 was just getting underway when, on August 16, 1987, a Northwest Airlines MD-80 crashed on takeoff at Detroit, killing all but one of the 157 persons aboard as well as two persons on the ground. FAA actions in response to the accident included required changes to MD-80 warning systems and steps aimed at improving flight crew performance. In addition, Administrator McArtor announced FAA would begin a special inspection of the U.S. aircraft manufacturing industry to ensure that the companies were following proper procedures and had updated their techniques to keep abreast of advances in technology.

An April 1988 crash raised a heretofore unrecognized problem — the continuing airworthiness of aging aircraft. An 18-foot gap opened in flight in the fuselage of a 19-year old Boeing 737 operated by Aloha Airlines. Decompression swept a flight attendant through the opening and seriously injured eight other persons. The plane made an emergency landing on the Hawaiian island of Maui. In the immediate aftermath of the accident, FAA ordered inspections of Boeing 737-100 and 737-200 jets logging more than 55,000 landings to look for fatigue damage and restricted those planes to 23,000-foot altitude until inspected.

FAA opened a three-day international conference on the problems of aging airliners on June 1, and over 400 participants attended the meeting. The gathering led to the establishment of a government-industry task force on the issue and to FAA actions that included increased research and development (R&D) in the aging aircraft field, acquisition of expertise in non-destructive inspection techniques, consideration of new structural inspection programs for older commuter aircraft, the use of FAA teams to monitor maintenance checks on older aircraft, and rulemaking projects aimed at improving the safety of high-service airliners. The conference became the first in a series of annual meetings.

1988, Aloha Airlines accident

The Aviation Safety Research Act (Pulic Law 100-591), signed into law by President Reagan on November 3, 1988, broadened FAA's role in aircraft-related research. The act authorized the agency to develop new technologies and conduct data analyses in such fields as the effects of wear and fatigue on aircraft structures, aircraft maintenance, materials resistant to smoke and fire, low flammability fuels, and methods of containing in-flight and post-crash fires.

Aging aircraft research

Organizational Changes

In September 1981 FAA Administrator Lynn Helms announced a regional consolidation plan under which the number of regions would be reduced from eleven to nine. Under the plan, FAA combined the existing Pacific-Asia and Western Regions into a new Western-Pacific Region with headquarters in Los Angeles, and closed the Honolulu regional office. The agency combined the existing Rocky Mountain and Northwest Regions into a new Northwest Mountain Region with headquarters in Seattle, and closed the Denver regional office. It also reassigned the states of North and South Dakota from the Rocky Mountain to the Great Lakes Region.

Later in the year, Helms continued decentralization efforts when he created four aircraft certification directorates. The directorates assumed the certification responsibilities previously assigned to the lead regions. They also had additional responsibilities to strengthen and streamline the certification process. The directorates included: Central (for aircraft under 12,500 pounds), Northwest Mountain (for transport aircraft), Southwest (for rotorcraft), and New England (for engines and propellers). The authority of the directorates extended beyond regional boundaries. For example, aircraft certification offices in the Central, Southern, and Great Lakes regions reported directly to the Small Airplane Certification Directorate at the Central Region headquarters. FAA formally established the directorates by an order dated February 1, 1982.

Another major organizational change occurred in 1987, when Washington National and Dulles International Airports passed from FAA management to that of an authority representing multiple jurisdictions. President Reagan signed Public Law 99-591, including Title VI, the Metropolitan Washington Airports Act of 1986 on October 30, 1986. The legislation authorized the transfer of control of Washington National and Dulles International Airports to an independent regional authority. An agreement between Virginia and the District of Columbia established the regional authority, which would be governed by a board of 11 members

Maintenance on aging aircraft

appointed by the Governor of Virginia (5), the Mayor of the District of Columbia (3), the Governor of Maryland (2), and the President (1).

The Metropolitan Washington Airport Authority (MWAA) took over management of National and Dulles airports from FAA on June 7, 1987. Under the terms of a lease agreement with the federal government, the new authority would operate the two airports for 50 years and would pay the government a total of $150 million for the lease period. Almost 700 FAA employees left the agency to join MWAA, and a directive issued on October 26, 1987, abolished FAA's Metropolitan Washington Airports organization.

Washington National Airport

Dulles International Airport

On March 9, 1988, James Burnley, Secretary of the Department of Transportation, announced the creation of a task force on FAA reform, co-chaired by FAA Administrator T. Allan McArtor and the DOT Assistant Secretary for Administration, to recommend improvements in the operations within FAA and between FAA and the Office of the Secretary. A subgroup of the task force was asked to recommend changes to improve FAA's safety rulemaking process. That subgroup proposed the establishment of an advisory committee to serve as a forum for FAA to obtain input on major regulatory issues. The Secretary approved the proposal, and on February 15, 1991, the FAA Administrator established the Aviation Rulemaking Advisory Committee (ARAC) to assist FAA in the rulemaking process. ARAC included representatives of air carriers, manufacturers, general aviation, labor groups, universities, associations, airline passenger groups, and the general public.

Secretary Burnley also asked the task force to find a way to eliminate marginal, non-safety expenditures and to improve the procurement process. On April 28 DOT and FAA announced that the task force's recommendations would include a variety of improvements in practices and procedures, including "straightlining" of reporting relationships. Under this arrangement, regional division managers in key programs would report to associate administrators at national headquarters rather than to the regional directors.

Administrator McArtor announced a reorganization of FAA's senior management structure on June 16, 1988, as part of efforts to: improve communications, coordination, and management oversight of FAA's technical modernization and other activities; reduce unnecessary reporting relationships; and give Washington headquarters more authority over field operations. FAA increased the number of

executive director positions from one to four and consolidated most of the agency's functions under these individuals:

(1) Executive director for policy, plans, and resource management. Reporting to this position were the:

- Associate administrator for policy, planning, and international aviation;
- Associate administrator for human resource management;
- Associate administrator for administration;
- Regional administrators; and the
- Director, aeronautical center.

(2) Executive director for systems operations, who oversaw the efforts of the:

- Associate administrator for air traffic;
- Associate administrator for airway facilities;
- Director of operations planning and policy; and the
- Director of operations resource management.

(3) Executive director for regulatory standards and compliance, who oversaw the efforts of the:

- Associate administrator for regulation and certification;
- Associate administrator for aviation standards; and the
- Director of program and resource management.

(4) Executive director for system development, who oversaw the efforts of the:

- Associate administrator for advanced design and management control;
- Associate administrator for NAS (national airspace system) development;
- Associate administrator for airports; and
- Director, technical center.

In addition to the executive directors, other positions reporting to the Administrator included: associate administrator for aviation safety; the chief counsel; and three assistant administrators for public affairs, civil rights, and government and industry affairs. Administrator McArtor also implemented a straightline reporting system under which regional division program managers for air traffic, airway facilities, aircraft certification, flight standards, civil aviation security, medical, and airports reported to associate administrators at national headquarters instead of the former regional directors. Under the new arrangement, the regional and center counsels reported solely to the chief counsel.

FAA Headquarters, Washington, DC