In the Unlikely Event...

The Politics of Airline Safety

The Center for Public Integrity
About the Center for Public Integrity

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ISBN: 1882583-10-8
Printed in the United States of America
A Note About the Cover

The fourth photograph in the series of images on the cover of this report depicts the remnants of wiring bundles from the undersea wreckage of TWA Flight 800, which exploded and plunged into the Atlantic Ocean near Long Island in July 1996. The photograph was taken by Edward Block, a Defense Department whistle-blower who, for more than fifteen years, has sought to call attention to problems associated with the type of wiring shown in the picture. In April 1998, Block visited the hangar in Calverton, New York, in which pieces salvaged from the TWA Boeing 747 have been painstakingly put back together. "The aircraft was intricately reconstructed in a grid-work of twisted metal, surrounded by miles and miles of cracked, chafed, and badly burned wires," Block told the Center. "These defective wires still run above, below, and around the unknowing flying public, carrying the power and signals critical to all the flight systems keeping them in the air. As I walked among the myriad burned spider webs called Poly-X wire, I was amazed only that it hadn't happened sooner."
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Summary

It's no secret that the United States has the safest commercial airline system in the world. Last year, more than 600 million passengers on commercial airplanes successfully traveled on more than 8 million flights in this country. That fact is truly impressive by any standard, and it's understandable and not all surprising that the industry frequently cites these statistics.

This doesn't mean, however, that there are not preventable deaths and permanent injuries each year from air travel. And the American people are quite aware of that fact. Ninety-four percent of the 1,017 airline passengers surveyed by Money magazine in November 1997 indicated that safety was a "critical" or "very important" element in choosing an airline. For most people, in fact, safety is a more important consideration than the relative cost of air travel.¹

The extent of the public's concern about airline safety was revealed last year in a Time magazine/CNN poll in which 42 percent of the respondents said that they believed commercial flying was not as safe as it was five years ago. More than 60 percent cited poor airline maintenance, aging planes, the threat of terrorism, and the failure of manufacturers to fix identified safety problems as the main reasons commercial flying was not as safe.²

In this second "Congress and the People" study, we have explored that last point—the failure of the manufacturers to rectify serious, widely recognized safety problems. It is the role of our federal government—the Federal Aviation Administration, the National Transportation Safety Board, and Congress—to safeguard the public safety in the skies. Congress plays the most powerful role because of its oversight responsibility over the FAA, the NTSB, and the airline industry. It can subpoena records and witnesses for public hearings on whatever subject it chooses, promulgate new laws, and withhold or increase the taxpayer dollars given to these federal regulatory agencies. It has the power, in
other words, to set the public's agenda. To do its job most objectively and independently, of course, Congress should be unfettered and not beholden to any economic interest affected by its decisions.

The Center for Public Integrity has never undertaken a study about airline safety. As a nonprofit, nonpartisan organization that publishes investigative studies about public-service and ethics-related issues, the Center does not take formal positions on legislative matters, and we certainly have no "agenda" when it comes to public-policy alternatives in the area of airline safety. As with nearly all of our past thirty reports released since 1990, our interest is very simple: examining the decision-making process of government and whether or not it has been distorted in any way.

This major Center investigation involved conducting scores of interviews and reviewing thousands of pages of data from the Federal Election Commission and the Center for Responsive Politics, records of the Federal Aviation Administration and the National Transportation Safety Board, House and Senate lobbying and financial disclosure reports, and congressional hearing transcripts, in addition to thousands of secondary sources.

We found that Congress has repeatedly put the economic interests of the airline industry ahead of safety concerns. Congress, in fact, has repeatedly—and in many cases needlessly—put off straightforward action to protect and enhance the safety of the flying public.

Among the Center's principal findings:

- Passenger seats in a commercial airliner provide less protection than the average seat in a family car. By law today, a car seat must be able to withstand twenty g's of force, or twenty times the force of gravity on a person weighing 170 pounds. In 1987, Congress ordered the FAA to require that seats in commercial passenger aircraft be able to survive sixteen g's of force. More than ten years later, the FAA requires the stronger seats only in the Boeing 777. All other aircraft, even those rolling off the assembly line today, need only meet the nine-g impact standard that was adopted in 1952, when propeller planes ruled the skies. Over the past decade, as the industry and the FAA have dragged their feet regarding the seat safety standard, Congress has not held a single hearing on this subject.

- In April 1998, nearly two years after TWA Flight 800 exploded and plunged into the Atlantic Ocean, killing all 230 aboard, the National Transportation Safety Board urgently called on the FAA to inspect hundreds of U.S. airliners for damaged and deteriorated wiring. The 25-year-old Boeing 747 contained a type of
wiring that had been removed from hundreds of military aircraft in the 1980s because of its tendency to deteriorate and create dangerous sparks. The NTSB's announcement made headlines around the world, but it told only part of the story: The FAA—and Congress—had ample warnings about the risk to airline passengers for more than a decade but had chosen not to act.

- The nation's major airlines, aircraft manufacturers, and other aviation interests have poured more than $43.8 million into congressional campaigns since 1987. Their investment has clearly paid off, as Congress has largely allowed the industry to regulate itself. Some Capitol Hill lawmakers with key roles in airline-safety matters have taken in hundreds of thousands of dollars in campaign contributions from airline companies and other aviation interests. Congress's number-one recipient of campaign money from the aviation industry is James Oberstar of Minnesota, the former chairman of and current ranking Democrat on the House Transportation and Infrastructure Committee, who has taken in more than $303,000 since 1987.

- The aviation industry has built one of Washington's most effective lobbying juggernauts, partly by recruiting former Capitol Hill lawmakers and congressional aides into its ranks. Of the 805 lobbyists whom the Center identified as working for the aviation industry in 1997, at least 47 previously worked on Capitol Hill.

- By any reasonable standard, Congress has failed to hold the FAA accountable for its dismal record in acting on key safety recommendations made by the NTSB. Why must the NTSB, for example, constantly push the FAA "to adopt safety steps that can help prevent accidents and save lives"? Consider this passage from the NTSB's own Web site, which features the agency's "most-wanted list" of transportation safety improvements: "The NTSB first urged the FAA to require these improvements [smoke detectors and fire extinguishers] following a 1988 passenger plane fire. Last year's ValuJet crash into the Everglades reinforced the need for these changes."

The failure of the airline industry to fix identified safety problems—and the complacency of the FAA and Congress in allowing it year after year—was easily the most striking discovery of our investigation. People have died or been maimed for life because of this inaction.

Would there be more aggressive congressional oversight or new reform legislation if Congress were not so dependent on the airline industry? Would
Members of Congress be more objective in their oversight responsibilities if they had not received hundreds of thousands of dollars in speaking fees from the industry, if their political parties had not received hundreds of thousands of dollars in free flights around the nation, if their former colleagues and staff had not doubled or tripled their annual salaries as airline-industry lobbyists, knocking on lawmakers' doors every day? Would Members of Congress be less sympathetic to the economic, cost-benefit rationales propounded by the industry as an excuse not to improve safety standards if they weren't taking large sums of campaign cash from them? Logic and common sense can only answer these questions in the affirmative.

On the subject of enacting public policies to help ensure airline safety, the agenda in Congress today is substantially set by the industry. It is apparent that the aviation interests have overwhelmed the supposedly objective decision-making process in Washington as it pertains to them. As a result, today, when it comes to airline safety, Congress is more responsive to aviation interests than to the broad public interest. And for the flying public, that means, simply, that the skies aren't as safe as they ought to be.
"There was no warning," said Christine Peters, recalling the terrors of USAir Flight 1016. Peters, an administrator at the University of South Carolina in Columbia, was heading to Pittsburgh to visit her mother, who was to undergo surgery for cancer later that week. She bought a discount ticket at the last minute, to take advantage of the long Fourth of July weekend.

The big DC-9 on which Peters was a passenger on July 2, 1994, was five minutes from touchdown in Charlotte, North Carolina—a stopover on its way to Pittsburgh—after a 35-minute hop from Columbia, South Carolina. Peters wasn't distracted by the turbulent descent; she was accustomed to flying, having traveled often as part of her job, and this seemed like any normal trip. She was engrossed in a magazine article, racing to complete it before the plane reached its gate.

Suddenly Peters heard what sounded like the jet reversing its engines to brake. But the plane wasn't even on the runway. Next she felt the rapid deceleration of the plane, followed by the thrust of the pilot gunning the engines, and she was pitched back into her seat. "I glanced out the window to my right and saw [the tops of] trees," Peters later wrote in testimony to the National Transportation Safety Board, which investigates all major transportation accidents in the United States. Before she could prepare herself for the impact, the plane slammed to earth. More violent impacts followed. "I was basically at the mercy of the plane...sort of like a rag doll," she wrote.

After it hit the ground, the DC-9 split into four pieces and skidded wildly. The tail section came to rest against the carport of a house. Following the screaming of passengers and the whining of twisted metal, there was silence. Peters, still in her seat, was covered with tree branches and debris from the crash. Slowly, passengers began calling for help.
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A fireball flared in Peters's face. "I thought, I'm engulfed in flames and I'm going to die," she told a reporter for the *Pittsburgh Post-Gazette* after the crash. As she began crawling through the wreckage, looking for a way out, she heard the man in the next seat to hers pleading for help. "Only the top of a head and the cowboy boot on his foot were visible," Peters recalled in an interview with the Center for Public Integrity. She saw a flight attendant, and the two of them opened one of the plane's emergency exits. Flames shot toward them, blocking the passage.

"It's so incredible, when you listen to the stewardesses giving the speech of 'Here's your two exit doors,' " Peters told the *Post-Gazette*. "When you crash the way we crashed, there are no exit doors. Definitely, none. My main thought was to look where there was light, see if it was outside, and try to head for that."³

Peters was one of twenty survivors of Flight 1016. Thirty-seven people died in the crash. It was not the force of the crash alone that killed those 37 passengers. Zebb Strawn, a Charlotte sheriff's deputy, told the *Post-Gazette* that he heard someone banging on the tail section of the plane "There was nothing I could do," he said. "I couldn't get to him There were flames between him and me."

Keith Herrin, a friend of Strawn's, was also at the scene. "They were screaming and banging," Herrin said of the passengers trapped in the tail section, "but we couldn't get them out."⁴

For passengers, like Peters, who survive the impact of a plane crash, time is of the essence. The National Transportation Safety Board has calculated that in survivable crashes, twice as many passengers die from fire and smoke inhalation as from the impact. What kills them is the lethal environment in the fuselage—passengers are trapped or are so injured that they're physically unable to escape the burning wreckage of the plane.⁵

Flight 1016 hit the ground at a speed of 160 miles per hour—almost three times faster than a car traveling on a highway. Yet the seats in a passenger car—say, a tiny Chevy Metro—provide more than twice as much protection to occupants in a crash as do the seats of the average airliner. By law, a car seat must be able to withstand twenty g's of force, or twenty times the force of gravity on a person weighing 170 pounds. By contrast, the seat on a Boeing 747, a McDonnell Douglas DC-9, or an Airbus 300 need only withstand nine g's of force. Little wonder, then, that so many passengers die needlessly from fire and smoke in the aftermath of a crash.
Flying, as anyone who has ever tried to reason with a nervous fellow passenger knows, is the safest form of travel. The Federal Aviation Administration, the agency that regulates the airline industry, can cite reams of statistics to back up that assertion. Hypothetically, given the accident rate of U.S. carriers, a passenger would have to fly 24 hours a day for 438 years before being involved in a fatal accident, according to the FAA.

Of course, there was nothing hypothetical about the 57 passengers on USAir Flight 1016. They trusted the FAA to put their interests above the interests of the airlines, and they were betrayed—but not by the FAA alone. They were betrayed by Congress.

Perhaps more than any industry in the United States, the aviation industry—the airlines, the manufacturers that provide them with planes and parts, the repair stations that service aircraft, the airports where planes take off and land—is a creature of the federal government. At one time, Boeing, McDonnell Douglas, and Lockheed all manufactured commercial aircraft; among their first customers, however, was the Army Air Corps. In the 1920s, the fledgling passenger airlines relied on the postmaster general—and the contracts he awarded to carry air mail—to keep their businesses aloft. The Civil Aeronautics Board, which initially was part of the Commerce Department, regulated fare prices, set route structures, insulated the airlines from competition, and decided which communities would be served by scheduled passenger service. Over the years, Congress has been no less accommodating to the airlines and the agencies that—in theory—regulate them.

From 1987 through 1996, congressional committees and subcommittees held 197 hearings covering virtually every aspect of the airline industry. In March 1988, for example, the House Public Works and Transportation Subcommittee on Investigations and Oversight held hearings in an effort to determine why the FAA hadn't taken action to prevent airlines from removing the overwing emergency exits from Boeing 747s. Three years earlier, Congress had blistered the FAA for allowing airlines to remove the exits in order to fit more passenger seats into the jets. Although the FAA's administrator at the time, David Engen, had asked airlines to refrain from removing the doors shortly thereafter, no formal rule change to reflect his request had been made. Among other hearings: In February 1991, the House Government Operations Subcommittee on Government Activities and Transportation examined runway incursions after an accident at Los Angeles International Airport. In July 1996,
the House Transportation and Infrastructure Subcommittee on Aviation considered a bill to ban smoking on all U.S. airlines, both domestic and international. In December 1987, the House Government Operations Subcommittee on Government Activities and Transportation discovered that airport security guards in California wore secondhand uniforms and paid $36.50 out of their own pockets to be licensed to work in airports.

Yet despite the panoply of hearings, Capitol Hill lawmakers have largely allowed the airline industry to regulate itself. Airplanes are the principal assets of any airline, and airlines tend to guard their assets jealously. According to Boeing, the cost of a new 747 can be as high as $176.5 million; a 737—the most popular jet in the United States today—costs up to $54.5 million. Sometimes, the narrow interests of the industry coincide with the safety and economic concerns of the broader public. In many cases, however, these interests diverge.

Airlines have consistently lobbied against and blocked new measures that would make plane crashes more survivable, such as installing stronger passenger seats, and have tried to weaken long-established standards, as in the case of the 747 overwing exits, that offer a small measure of safety in the event of a catastrophic crash. The airlines and manufacturers have also ignored an issue that has taken hundreds of military aircraft out of service: a host of problems with the insulation on the electrical wiring that runs through an airplane. Indeed, the FAA doesn't even mandate inspections of the aging, cracking insulation, which can be damaged by corrosive fluids such as the solvents used for deicing wings, by distilled water, and even by sunlight. And Congress has allowed the nation's air transportation system to be dominated by a few large companies, forcing many consumers to pay outrageous fares and sometimes leading to needless deaths.

The Center for Public Integrity chose to use a single airline accident—the crash of USAir Flight 1016—to illustrate Congress's negligence in three key areas of airline safety: its failure to force the use of stronger, and thus safer, seats in airliners; its failure to ensure that infants and toddlers fly in safety seats rather than in the laps of adults; and its failure, in the wake of deregulation, to make the skies ever safer by maintaining adequate competition in the airline industry.
During the course of its investigation, the Center has learned:

- The aviation industry has invested heavily in Capitol Hill lawmakers in the past decade, pouring at least $43.8 million into congressional campaigns since 1987. Nine of the top 25 recipients of industry money in the Senate and eleven of the top 25 recipients in the House of Representatives are on committees that directly oversee the industry. James Oberstar of Minnesota, the former chairman of and the current ranking Democrat on the Transportation and Infrastructure Committee, was the top recipient of aviation-industry money in the House, taking in at least $303,505 from 1987 through 1996. House Speaker Newt Gingrich was the third-highest recipient, with $275,165 in contributions during the same period; House Minority Leader Richard Gephardt was seventh, with $218,750. In the Senate, Republican Ted Stevens of Alaska was the top recipient of aviation-industry money; he took in $247,616 in contributions. Stevens is a member of the Commerce, Science, and Transportation Subcommittee on Aviation.

- Airlines can fly planes in their fleet as long as they wish, and the average age of the 3,469 passenger planes operated by the major airlines is 12.3 years. Trans World Airlines has the oldest fleet (19.3 years), followed by Northwest Airlines (19.1 years) and Continental Airlines (14.2 years). As of January 1, 1997, 49 of TWA's 191 planes were built in the 1960s, as were 131 of Northwest's 410 planes. Overall, the major airlines used 623 planes that were more than twenty years old, 312 of them built before 1970.

- The strongest seat in an airliner provides less protection than the average seat in a family car. In 1987, Congress ordered the FAA to require seats in commercial passenger aircraft to survive sixteen g's of force—stronger than the nine-g standard then in effect but still weaker than the twenty-g strength that automobile manufacturers must meet. After a rule-making process that has dragged on for more than a decade, the FAA now mandates the sixteen-g seat only in the Boeing 777.

- Under its Civil Enforcement Program, the FAA fined airlines some $5.8 million in 1997 for violations of safety procedures. Lax security practices led to $2.8 million in fines, followed by improper maintenance procedures ($1.2 million), inaccurate record keeping ($1.2 million), and unsafe flight operations ($225,500). The FAA slapped the biggest fine—$677,000—on Kiwi International Airlines, Inc., for inaccurate record keeping, followed by World Airways, Inc., a charter company ($621,500, mostly for lax security practices). Among major carriers, Southwest
Airlines topped the list ($479,250, most of which was for security violations), followed by American Airlines ($422,700), United Airlines ($341,000), Northwest Airlines ($300,625), Delta Air Lines ($179,300), and USAirways ($173,500). Valujet and its successor, Airtran Airways, Inc., were fined $72,900, including $69,900 for security violations.

• At the same time, however, the FAA's cozy relationship with the airlines it regulates compromises the agency's Civil Enforcement Program. The Transportation Department's Office of the Inspector General found that the FAA's practice of allowing airlines to pay the costs of training FAA flight inspectors "tend[s] to preclude FAA enforcement action on specific aircraft, airmen, and even the air carrier, regardless of circumstances that typically would result in enforcement." An FAA assistant chief counsel—responsible for fining airlines or grounding their planes—described the training program as a "quid pro quo" that could block enforcement, even if there were a high safety risk. Some 31 airlines have entered into 72 agreements with the FAA to provide free flight training, including American Airlines, Continental, Delta, Northwest, Southwest Airlines, Trans World Airlines, United, and USAirways.

• On some important safety issues, the FAA moves at a tortoise-like pace. Still on the agency's "to-do" list, after years of inaction, incompetence, or intransigence, are:
  • An upgrading of the nation's air-traffic-control system to handle the ever-increasing amount of air traffic. First proposed in 1981. Delay: seventeen years.
  • A requirement of stronger seats in aircraft. Originally proposed by the NTSB in 1981; encouraged by Congress in 1987. Delay: seventeen years.
  • A requirement that infants and toddlers fly in safety seats rather than in an adult's lap. First proposed by the NTSB in 1990. Delay: eight years.

The Center examined safety recommendations made by the NTSB to the FAA from 1991 through 1997. Of the 611 closed recommendations, the FAA took an average of 463 days—a year and three months—to take action on changes designed to enhance passenger safety. In only four cases did the FAA take action that exceeded the NTSB's recommendation. In 73 cases, the NTSB found that the FAA's actions were unacceptable. In some cases, the FAA rejected calls for improvements in airline safety that the airlines then implemented themselves, without FAA approval. "While the public thinks the government will guarantee the safety of the airlines, the most important safety measures come from the airlines," David Rapoport, an attorney who has represented several plaintiffs involved in airline crashes, told the Center. "The government really doesn't have the budget or the resources to regulate them."
• Consolidation in the airline industry has left consumers with few choices. A Center analysis of service between 1,149 pairs of cities in the contiguous 48 states found that 88 percent of these routes were, according to the definition of the Federal Trade Commission, highly concentrated. On 372 of the routes, one airline controlled more than 70 percent of the market. Of the fifteen largest increases in airline fares from October 1996 through September 1997—the most recent statistics available—seven followed the successful effort of a major carrier to drive a low-cost competitor from its market.

The airline industry itself is often more attuned to preventing crashes than the FAA, the agency that regulates it. But the industry has often resisted adopting technological improvements that would save lives in the event of a crash. For decades, safety experts—both in the government and in the private sector—have called on the airlines to adopt a technology that would save lives. But year after year, the airlines and the FAA have insisted that the cost of this technology is too high. Despite the evidence that horrific deaths could be prevented, that crippling injuries could be avoided, that air crashes need not be fatal, Congress has endorsed the view of the industry and the FAA: Saving lives is not cost-effective.

In 1987, Congress passed the Airport and Airway Safety and Capacity Expansion Act. Buried in the minutiae of the bill was a directive ordering the FAA, in the words of Democrat Norman Mineta of California, then the chairman of the House Public Works and Transportation Committee, "to go forward with important safety-related rulemaking, including rulemaking to require higher standards for the strength of airline seats." 8

Six years earlier, the NTSB had issued a report that studied the effects of 77 large-force crashes on airline seats and the people riding in them. "The limiting factor for survival in these crashes is not human tolerance limits; instead, it is the lethal nature of the environment inside the fuselage," the report said. "Occupants are being injured, trapped, and killed in survivable accidents." 9

Or, as Representative James Oberstar said in an interview with the Center, "What happens, of course, in the crash is that the seats shear and more people are killed by being crushed than by the force of the crash."

Thomas McSweeny, one of the FAA's top safety officials, told the Center that because airplanes crash so rarely, the expense of upgrading seat strength wasn't worth it. If you fly an airplane only over the desert," he said, "should you equip it with life preservers?"
Among the report's gruesome findings:

- In 1976, an Allegheny Airlines DC-9 crashed 6,000 feet from a runway at Philadelphia International Airport. Of the 36 passengers who suffered severe injury, the majority had their spines snapped when their seats failed.

- In 1972, a United Airlines Boeing 737 crashed in a residential area near Chicago's Midway Airport. Of the 61 people on board, sixteen died on impact. Twenty-seven others became tangled in wreckage, immobilized by limbs that shattered when their seats failed. They survived just long enough to perish from the fire, smoke, and toxic fumes that filled the fuselage.

- The NTSB reported that seats failed in 84.4 percent of the crashes it studied, "allowing the occupant to become a missile traveling at essentially the same velocity as the aircraft just before impact."

When the NTSB issued its report in 1981, an airline seat had to be able to withstand nine g's of force. The nine-g standard had been established by the Federal Aviation Agency, the FAA's predecessor, in 1952, when the commercial jet was still on the drawing board and propeller planes had the skies to themselves. In 1987—when Congress finally told the FAA to set a higher standard for seat strength—an airline seat was required to withstand the same nine g's of force. Yet seven years later, when USAir Flight 1016 crashed as it approached Charlotte, North Carolina, killing 37 passengers, the seats on the plane were still required to withstand no more than nine g's. According to the NTSB accident report, the crash damaged, dislodged, or destroyed 91 of the 103 seats on the DC-9. Christine Peters was lucky enough to have been sitting in one of only twelve seats that survived the crash intact.°

What happened to the better seat standard that Congress had mandated?

"There are a number of factors about the cost-benefit analysis," Oberstar told the Center, "about the complexity of the rule-making process, of the sign-offs and the levels they have to go through."

The rule-making process in Washington is indeed complex, but in the case of airline seats, there's a simple reason nothing has been done. Among "the
signoffs and the levels" the FAA must go through are the very companies the rule would affect: the airlines.

Why hasn't the FAA required the airlines to use stronger seats?

"Plain and simple—dollars," Thomas McSweeny—who, as the director of the FAA's Aircraft Certification Service, is one of the agency's top safety officials—told a reporter for *The Washington Post* in a 1989 interview."

In 1988, the FAA calculated that installing new seats would cost the airlines a total of $33 million but would save them $62 million in claims made by the families and estates of passengers killed in air crashes. The Air Transport Association of America, the lobbying arm of some 21 airlines and air cargo companies, waged a war of numbers to kill the rule, arguing that the new seats would actually cost $215 million a year.

The FAA accepted the industry's estimate. McSweeny told the Center that because airplanes crash so rarely, the expense of upgrading seat strength wasn't worth it. "If you fly an airplane only over the desert," he said, "should you equip it with life preservers?"

To date, after a rule-making process that has dragged on for more than a decade, the FAA requires only the Boeing 777 to use stronger seats. Those seats can withstand sixteen g's, or 20 percent less force than a seat in the family car can. All other aircraft, even those rolling off the assembly line today, need only meet the nine-g standard.

In a March 6, 1996, letter to the FAA, Michael Rioux, the ATA's vice president for engineering, maintenance, and materiel, listed the distribution of seat types in use on the planes of eleven of the group's member airlines. The survey covered some 3,359 commercial aircraft, outfitted with 525,137 passenger seats. More than half of them—52 percent—could withstand no more than nine g's of force.

Congress, however, is content to bide its time on the issue of seats. As Oberstar told the Center, "I feel that as a committee with two or three staffpeople and a dozen issues to draw your attention to, you can spend only so much time on a subject and repeatedly come back and revisit and push."
On the evening of May 5, 1935, a TWA DC-2 airliner on a flight from Los Angeles to Newark, New Jersey, made a scheduled stop in Albuquerque, New Mexico, where a technician discovered that the plane's radio was malfunctioning. But the TWA pilot, on learning that the weather report was good for Kansas City, the plane's next scheduled stop, decided to continue without repairing or replacing the radio. By 3 a.m., however, when the plane was approaching its destination, the weather had taken a dramatic turn for the worse. The cloud ceiling over the Kansas City airport had dropped to 600 feet, below the safe minimum for landing. On his broken radio, the pilot could hear ground dispatchers frantically trying to guide him in, but he was unable to communicate back. Finally, in desperation, he turned northeast to look for a rural airstrip where he could make an emergency landing. When he got there, the landscape was shrouded in even denser fog, but by then the plane was running out of fuel, so he had no choice. The aircraft slammed into a barn and flipped over into a sixty-foot embankment, killing the pilot and four of his nine passengers.1

Nearly 950 miles away in Washington, D.C., the accident might have gone unnoticed, except that one of those killed in the crash was Bronson Cutting, a Republican Senator from New Mexico. (Cutting was one of eighteen Members of Congress who have died in plane crashes since 1928; see page 83.) The official investigation of the crash put most of the blame on the pilot of the DC-2. But one of Cutting's colleagues, Senator Royal Copeland, the chairman of the Commerce Committee, wasn't satisfied with the findings, so he launched his own year-long, high-profile investigation into the accident. Copeland's committee went beyond the circumstances and potential causes of the fatal crash to examine the entire subject of aviation safety—in particular, federal regula-
tion of the still-embryonic airline industry, which Congress had entrusted to the Commerce Department in 1926. On Capitol Hill, there was a hue and cry for the formation of a new, independent agency to regulate the industry and to promote air safety. Over the next fifty years, that would become an ingrained pattern, with Congress tending to act only in the aftermath of tragedies.

In what would also become part of the pattern, the political landscape had changed by the time Congress got around to passing the Civil Aeronautics Act of 1938. Thanks to the efforts of the airline industry and its recently formed lobbying arm, the Air Transport Association, Capitol Hill lawmakers had focused more on the industry's economic welfare than on regulatory and safety issues. Consequently, the independent agency created under the law, the Civil Aeronautics Authority, had the power to exempt air travel from the nation's antitrust laws and to award air routes in a way that guaranteed financial stability for the airlines. Just two years later, the Civil Aeronautics Authority was renamed the Civil Aeronautics Administration, and some of its safety and regulatory duties were given to a second, independent organization, the Civil Aeronautics Board. As an indication of how little had changed in Washington, the CAA became part of the Commerce Department.

Over the next two decades, Congress paid scant attention to the issue of air safety. In the years after World War II, the airline industry grew explosively, but up until the mid-1950s air-traffic control was virtually nonexistent. Airport officials mostly made do without radar, depending instead on radio communications and a "see and be seen" policy, in which pilots relied on little more than their vision to avoid other planes. Near misses began to occur daily—452 in the first four months of 1956 alone—but because the public never heard about them, Congress felt no pressure to act. As John Nance, a former airline pilot, put it in his book *Blind Trust.* "Near misses were not collisions. Near misses did not kill constituents." It took a series of horrific crashes to get Congress's attention.

In June 1956, a United Airlines DC-7 and a TWA Lockheed Super Constellation collided over the Grand Canyon, killing 128 people. Congress's belated response was to allocate funds for the installation of up-to-date radar systems at airports and to appoint a board that would study the construction of
modern air-traffic-control facilities, but it did nothing about beefing up safety regulations, even after an Eisenhower Administration study recommended doing so in May 1957. Finally, in May 1958, the day after an airliner collided with an Air Force jet over Brunswick, Maryland, Senator A.S. (Mike) Monroney, a Democrat from Oklahoma, was finally able to line up 33 cosponsors and introduce legislation to create a new, stronger federal air-safety agency. In August 1958, President Eisenhower signed the Federal Aviation Act into law, creating the Federal Aviation Agency, which in 1983 would become the Federal Aviation Administration.

But in creating the FAA, Congress saddled it with dual missions, sparking a conflict of interest that plagued the agency for decades. The first mission was to regulate the airlines. The second was to promote them. So when the FAA announced that, in theory, a passenger could fly round-the-clock for 438 years before being involved in a fatal accident, its purpose was not to inform the public about the safety of flying. The FAA was merely doing the job Congress had given it: helping to sell plane tickets.

For their part, Capitol Hill lawmakers have done well by the major commercial carriers. The airline industry, which pleads poverty whenever the subject of safety is raised, pumped at least $7.5 million into congressional campaigns from 1987 to 1996. During the same period, the commercial airlines and their trade associations paid 137 Capitol Hill lawmakers at least $312,750 in speaking fees. The airlines have also showered their friends on Capitol Hill with free tickets. United Airlines alone, for example, gave Republicans 300 vouchers for free flights in the first six months of 1996, according to the Center for Responsive Politics. The airline’s largesse was bipartisan; United gave Democrats 490 discounted tickets for travel to the Democratic National Convention in Chicago, as well as 33 free fares. Joe Hopkins, a spokesman for United Airlines, told the Center that the company views providing free and discounted fares to Capitol Hill lawmakers as "a business decision, not a political decision."

The airline industry is also happy to roll out the green carpet for ex-lawmakers and congressional aides. The Center found that, after leaving Capitol Hill, at least 47 lawmakers and congressional aides went on to become lobbyists for the airline industry. Consider the case of Ann Eppard, the former chief of staff to Representative Bud Shuster, who in 1995 became the chairman of the House Transportation and Infrastructure Committee. Eppard, an aide to Shuster for more than two decades, resigned as his chief of staff in late 1994 and within weeks became a lobbyist for several interests with business before the transportation committee. In so doing, she hit the jackpot: Ann Eppard
Associates took in more than $1 million in its first year, including more than $600,000 from transportation clients. Eppard has lobbied for United Airlines, among others. (Earlier this year, she was indicted by a federal grand jury for allegedly receiving $230,000 in illegal payments and with embezzling $27,500 from Shuster’s campaign committee.14)

Jim Courter, a former Republican Representative from New Jersey, lobbied Congress, the FAA, and the Transportation Department to get Valujet, Inc., recertified after the airline was shut down in the wake of the May 11, 1996, crash in the Florida Everglades that killed 110 people. Courter’s firm, Verner, Liipfert, Bernhard, McPherson & Hand, was paid $390,000 for Courter’s efforts on the low-budget airline’s behalf.15

James Coyne, a former Republican Representative from Pennsylvania, is now the president of the National Air Transportation Association, an 1,800-member trade group representing charter aircraft operators, flight schools, and maintenance/repair facilities, among others.16 Norman Mineta, a Democrat from California who chaired the Public Works and Transportation Committee until Republicans took control of the House following the 1994 elections, retired from Congress in 1995 to become a senior vice president of Lockheed Martin Corporation.17 Soon afterward, the FAA awarded Lockheed Martin a $1 billion, ten-year contract to upgrade its air-traffic-control equipment.18 (Mineta also chaired the 1997 National Civil Aviation Review Commission, created by Congress to recommended changes in the FAA.19)

In return for the generosity of the airline industry, Congress has put the safety of its profits before that of the flying public. It was finally forced to change the FAA’s dual mandate in the wake of the 1996 Valujet crash, when it became clear that, despite Valujet’s numerous safety violations, the FAA was more concerned with promoting the airline than with regulating it. But Congress has still left many safety issues in an endless holding pattern. And in the meantime, the FAA functions most often as the creature of industry—or it doesn’t function at all.

In 1959, U.S. airlines flew 3.9 million flights and carried 56 million passengers around the nation.20 In 1969, they flew 5.4 million flights and carried nearly 160 million passengers. Over the same period, the number of U.S. airline accidents actually decreased, from 67 in 1959 to 48 in 1969, and the rate of fatal accidents in proportion to departures dropped by half. By the 1970s, the chances that a flight would result in a deadly mishap had dropped to one in 1
A contributing factor was that, after a decade of pressure on Congress from pilots and the airlines, the "see and be seen" system was finally replaced, and Congress gave the FAA a modern air-traffic-control system. In the 1960s, new technology was developed that used the signal from aircraft transponders to precisely identify an aircraft, and computers translated the information so that a controller could read on his radar screen the aircraft identification, course heading, and altitude of planes. As Ralph Nader and Wesley J. Smith noted in Collision Course: The Truth About Airline Safety, their 1994 book on the airline industry: "Equipment installed in the 1960s was a tremendous step forward. Without it, the eventual burst of growth in commercial aviation could not have been accommodated safely." In its 1997 report, the National Civil Aviation Review Commission pointed to a different factor as the key: the switch to jet engines, which are far more reliable than the piston engines that powered propeller-driven airliners.

In 1978, Congress passed the Airline Deregulation Act and the federal government ceased setting prices and mandating carrier routes. The unrestricted marketplace led to financial turmoil in the industry, but the advent of discount airlines and price competition—from 1978 to 1991, fares declined in price by 31 percent in real terms—stimulated tremendous growth. By 1997, U.S. airlines were flying more than 8 million flights and carrying nearly 600 million passengers. Members of Congress lamented the number of airlines that had gone out of business and the fact that deregulation had not eliminated unfair practices in the industry, as the law ostensibly was intended to do. Indeed, Senator John McCain, a Republican from Arizona, complained at a 1991 hearing that "the opposite has happened—we see anticompetitive practices, we see excessive market domination." In April 1998, Transportation Secretary Rodney Slater accused large airlines of trying to drive smaller competitors out of business with predatory price cuts, which in the long term might result in higher fares, and he proposed guidelines designed to curb such tactics.

Still, Congress and the FAA continued to maintain that the rapid growth hadn't affected safety. "The U.S. aviation system, overseen by the FAA, is the safest in the world," Linda Daschle, then the FAA's acting administrator (and the wife of Tom Daschle of South Dakota, the Senate Minority Leader), proclaimed in a 1997 press release. After the ValuJet crash in 1996, Republican Ver...
non Ehlers of Michigan, a member of the House Transportation and Infrastructure Subcommittee on Aviation, said, "I think we have a very, very safe industry and a very, very safe record, and we shouldn't let recent events obscure that." But such reassurances were misleading, for despite all the technological advances in commercial aviation, the U.S. accident rate hadn't improved in twenty years.

"The simple math of the equation is that if the rate [of accidents] doesn't change and air traffic doubles, we're going to have twice as many accidents as we do today," Martin Bollinger of Booz-Allen & Hamilton, a management and technology consulting firm that evaluated the FAA, told Congress in 1996. Even the National Civil Aviation Review Commission, the blue-ribbon panel appointed by Congress and heavily influenced by industry interests, warned in its December 1997 report of the potentially dire situation ahead. By 2010, according to industry projections, there will be a catastrophic airline disaster every seven weeks in the United States. A "controlled landing into terrain"—that is, when a pilot, because of a miscalculation or a communications glitch, maintains control of the plane itself but becomes disoriented and crashes into the ground or a hillside—is likely to occur every other year.

Even with the recent history of low accident and death rates, the commission concluded, "there is a growing sense that the high level of public confidence in the safety of the aviation system will slowly erode over the next ten to fifteen years if significant steps are not taken to further improve aviation safety." Indeed, by those forecasts, accidents would increase dramatically even if the FAA were to maintain its present level of safety vigilance. To make matters worse, in recent years there have been increasing indications that the nation's "air-safety net" is starting to unravel, due to the stress of growing air traffic and, in some cases, agency mismanagement. Among the problems are an air-traffic-control system plagued by malfunctioning and outdated equipment; lapses in the aircraft-maintenance inspection process; the proliferation of "bogus" parts; inadequate crash-survivability of airplane seats; a growing frequency of near collisions on the runway; and dangerous wiring on aircraft.

Additionally, the safety of the nation's airways has been jeopardized by institutional torpor. The FAA has a history of resisting—and in some cases ignoring—safety recommendations made by the National Transportation Safety Board as the result of the board's crash investigations.
ignoring—safety recommendations made by the National Transportation Safety Board as the result of the board's crash investigations. The FAA's foot-dragging has been so pronounced that, in 1990, the NTSB began publicly releasing its "most-wanted" list of safety measures. A 1996 investigation by the *Dallas Morning News* found that the FAA had fully acted on only 57 percent of the NTSB's 3,300 safety recommendations and had rejected or resisted more than 500 of them. Ultimately, the FAA accepts approximately 85 percent of the NTSB's recommendations, but in some instances the agency has resisted important NTSB recommendations for years.

In 1988, for example, after a fire in a DC-9 that landed in Nashville, Tennessee, the NTSB recommended that the FAA require smoke detectors and fire-suppression systems in aircraft cargo holds. The FAA originally accepted the recommendation, but it abandoned the plan after cost-benefit studies required by the Reagan Administration showed that the $350 million expense of the equipment would outweigh the benefits.

Eight years later, ValuJet Flight 592 went down in the Florida Everglades as result of a fire in the cargo hold, killing 110 people. If the safeguards recommended eight years earlier had been in place, the NTSB concluded, the airliner's crew probably would have had enough time to make a safe landing. "The FAA didn't do it—not cost effective," Richard Kessler, whose wife, Kathleen, died in the ValuJet crash, complained to the White House Commission on Aviation Safety and Security in 1996. "You see, if the smoke detectors had been in those holds, my wife would be alive today. That's a big cost." In 1997, after airlines announced they would begin installing the fire safeguard on their own, the FAA said it would make such precautions mandatory by 2000.

In 1991, following the crash of a Boeing 737 jet in Colorado, NTSB investigators were frustrated by their inability to glean useful information from the jet's obsolete flight-data recorder—the "black box," as the device is commonly known (although it is actually orange). The older flight recorders keep track of only the most basic information, such as speed, time, and altitude, while newer devices track hundreds of types of information about a plane's performance, data that might help investigators determine the cause of a crash—and, in the process, perhaps prevent future ones. Mary Schiavo, who was the Transportation Department's inspector general from 1990 to 1996, writes in her book *Flying Blind, Flying Safe,* that the FAA resisted the idea, worrying how much it would cost the airlines in lost revenue while planes were pulled out of service for retrofitting. In 1994, the NTSB was again frustrated when a Boeing 737 that had crashed outside Pittsburgh turned out to have one of the older flight recorders.
The following year, at a conference on air safety sponsored by the Transportation Department, James Hall, the chairman of the NTSB, made his dissatisfaction known. "In this age of high technology, the American public is puzzled when we can lose a major aircraft...and not know what happened to it," Hall said. In August 1996, Southwest Airlines announced that it would voluntarily upgrade the black boxes on its planes. Ultimately, the FAA relented and submitted a proposed rule to the Office of Management and Budget in December 1996. The regulation went into effect the following July but is not scheduled to be completed until 2000, five years after the NTSB's recommended deadline.

In December 1996, five months after the explosion that destroyed TWA Flight 800, killing all 230 persons on board, the NTSB recommended taking immediate precautions to prevent fuel-tank explosions, such as putting colder fuel into the tank just before takeoff. The FAA rejected the immediate remedies, essentially arguing that they were flawed, and said that it would eventually develop its own solution to the problem.

At the NTSB's high-profile hearings on the disaster in December 1997, the board bolstered its argument by unveiling a study by Joseph Shepherd, an aeronautics professor at the California Institute of Technology, showing that a relatively slight decrease in fuel-tank temperature vastly reduced the danger of an electrical spark igniting an explosion. In the face of that powerful evidence, the FAA decided that the short-term fixes recommended by the NTSB were worth considering after all. The FAA also agreed to study another solution advocated at the NTSB hearings: converting all commercial airliners to JP-5, a less flammable jet fuel. At current prices, JP-5 costs two cents more per gallon than the fuel currently used by airlines, and the jet engines in airlines don't need to be refitted to burn the alternate fuel. Its only apparent disadvantage is that engines might be more difficult to start in extremely cold weather.

The FAA has been derided by critics for being a "tombstone" agency—that is, an agency that acts only in the aftermath of fatal accidents. To the extent to which that generalization holds true, however, much of the fault ultimately lies on Capitol Hill. If for decades the FAA has been conflicted between promoting the airline industry and regulating it, that's because Congress created that conflicted mission for the agency in 1958. If the FAA is at times reluctant to impose safety changes because they might cut into industry revenues, remember that, under a 1995 law, Congress requires federal agencies, before instituting most new regulations, to assess their effects on other levels of gov-
ernment or the private sector, as well as to identify a reasonable number of regulatory alternatives and to select the least costly or burdensome.\(^5\) (That same year, then-Senate Majority Lead Robert Dole and some other Republicans in Congress tried to pass legislation that essentially would have required the FAA and other regulatory agencies to show that the value of lives saved by new safety regulations was greater than their cost to industry. Dole fell just two votes short of closing debate and bringing the bill to a vote.\(^5\)) "Every time there is a crash, it is something of great concern to us, and we always want to be working toward making the safest aviation system in the world even more safe," Bud Shuster, the chairman of the House Transportation and Infrastructure Committee, explained in 1995. "But I think we also have to do it . . . with a sensitivity to the cost-benefit ratio."\(^5\) (Shuster's own "sensitivity to the cost-benefit ratio" may be shaped in some measure by the more than $140,000 in campaign funds he's received from aviation-industry interests since 1986.)

If the FAA is often slow to take action on safety matters, Congress is even more reluctant. In *Flying Blind, Flying Safe*, Schiavo complains that action seldom resulted from the hearings at which she testified during her six years in the Transportation Department. "Scores of Members of Congress did nothing, took no action, did not follow up on hearings with bills," she writes. "As soon as the hearings were over, their concern and their involvement evaporated. In fact, the media-driven hearings often reminded me of the old Judy Garland-Mickey Rooney movies. In those films, characters got into trouble, [and then] they'd gather together and exclaim: 'Let's put on a show!' Congress was the same—we'd all be called to their father's barn, but no action was ever taken. Their convictions fell with the curtain."\(^5\)

Indeed, Congress often holds hearing after hearing on the same problem over a period of years, but with few, if any, timely or meaningful results. Congress held hearings on the issue of child-safety restraints, for example, in 1990, 1996, and 1997, but was unable pass legislation that would require their use. It held hearings on the crumbling air-traffic-control system in 1985, 1993,\(^5\) 1995,\(^5\) and 1998, yet that degree of oversight was unable to stop the FAA from squandering $2 billion on a failed upgrade, or even to keep a subsequent, slimmed-down modernization pro-
gram from again falling behind schedule and possibly over budget.\textsuperscript{57} Congress held hearings on runway incursions in 1991 and 1997, but it failed to push the FAA to reduce near collisions on the tarmac.\textsuperscript{58}

Even in the face of disturbing allegations or revelations about an airline's safety record, some Capitol Hill lawmakers are reluctant to criticize the FAA or the airline industry. At the hearings into the 1996 Valujet disaster by the House Transportation and Infrastructure Subcommittee, for example, Ehlers offered words of reassurance to FAA administrator David Hinson, noting that as many people are killed in traffic accidents per day as died in the airline crash. "I don't understand the media feeding frenzy on things like \textit{this}," Ehlers complained. "I think it blows it all out of proportion and makes it difficult for us to deal with it. . . . The media space devoted to this is inordinate, much of it overexaggerating situations. It's made it very difficult for you; it's made it very difficult for the airline."\textsuperscript{59}
At around twenty minutes to seven on the evening of July 2, 1994, Tywonda Brown, 21, was in the last row of USAir Flight 1016, cradling her nine-month-old daughter, Danasia, in her lap. The flight represented a special treat for Brown and her daughter. They were on their way to visit Danasia's grandparents in Louisiana, and it was the child's first trip in an airplane.

"She was always happy and smiling," Brown said of her daughter in an interview with *The Charlotte Observer,* and this day was no different. For most of the DC-9 jet's flight, in fact, the skies offered Danasia's mother and her fellow passengers no reason not to share the child's mood.

Brown sat in her seat with Danasia. As had long been customary, the airline had allowed Brown to hold the baby on her lap, thereby saving her the expense of a second ticket. All of a sudden, the rain hardened into a deluge and the ride became bumpy. Brown held Danasia tighter. A woman sitting in front of Brown yelled, "Oh, my God, we're going to crash!"

When investigating an airline accident, the National Transportation Safety Board meticulously reconstructs every element of the disaster, from the sequence of events that led to the crash to the performance of the emergency-response teams that assist survivors in its aftermath. In the same way that the NTSB's technicians reassemble the shattered wreckage of a plane in a hangar, its investigators study each event—the actions of the pilots, the instructions of air-traffic controllers, the response of the flight attendants, and the fate of each passenger. The NTSB attempts to understand exactly what occurred in a disaster in order to prevent future tragedies.
After reviewing all the evidence, the NTSB issues a report, whose dispassionate tone can often diminish the horror of the events described. The report on USAir Flight 1016, for example, calls the crash a "flight into terrain during missed approach." While the words may not resonate in the public's mind, they certainly should strike a chord with the Federal Aviation Administration. Yet when the NTSB makes recommendations to the FAA based on its findings, the FAA, as often as not, ignores them. And Congress turns a blind eye to the agency's disregard for the public's safety.

On Flight 1016, Richard DeMary realized that he was still strapped into his seat. One of three flight attendants on board, he was responsible for helping as many passengers out of the wreckage as he could. He undid his belt and shouted: "Release seat belts and get out! Release seat belts and get out!" As he began to help people escape, the wrecked cabin filled with smoke. DeMary kept shouting, hoping the passengers would be roused by the authority in his voice. He helped a woman and a child out through a hole in the plane and then went back inside.

That's when he saw Brown, who had been knocked cold in the crash. When she came to, Danasia was gone. "I can't find my baby!" she shouted. For a moment, DeMary later told a reporter for the Pittsburgh Post-Gazette, he pondered going into the burning plane to search for the child. But it was getting hotter and his clothing was soaked with jet fuel.

Rescue crews were converging on the scene of the crash, struggling to put out the flames that stood between them and the victims they could hear calling out from inside the wreckage. Brown was helped to a spot where she could lie on the ground. Blinded by a splash of fuel, she heard a child cry out, "Mama!" It was the eighteen-month-old daughter of another woman who, just as Brown had done, had clutched her child to her chest when the plane hit. Like Brown, the woman had lost her grip on her child as she was thrown from her seat. Fortunately, when she looked up from where she had landed, the woman saw another passenger who somehow had ended up with the baby in her arms. "Thank God for whatever saved my daughter," she later told a reporter. "That's the only thing that saved her and me. There was nothing but God."

Brown clung to hope of a similar miracle as an ambulance rushed her to a hospital, but it was not to be. Later that day, a fire captain found Danasia's
body. The crash had hurled her tiny body three rows away from her mother at a speed of 120 miles an hour, and she died from massive head injuries. On April 4, 1995, the NTSB issued its report on the crash of Flight 1016, concluding that Danasia's death had probably been preventable.

On its Web site, the NTSB posts a "most-wanted list." The list doesn't consist of criminals or terrorists; instead the board lists the most urgently needed safety improvements in the nation's transportation system "that can help prevent accidents and save lives." Currently, the most-wanted list has 21 items listed; eight of them concern airlines. In every case, action is needed by the FAA.

The FAA is ignoring a February 22, 1995, recommendation to install better flight-data recorders on aging Boeing 737s. The NTSB made the recommendation after it was unable to determine the cause of two horrific crashes—a 1991 crash of a United 737 in Colorado Springs, Colorado, that killed 25 people and a 1994 crash of a USAir 737 in Aliquippa, Pennsylvania, that killed 132. The FAA argues that it would be too much of a hardship on airlines to install the devices. (Southwest Airlines is upgrading the flight data recorders on its own without disruption to its schedules.) Elapsed time without appropriate FAA action: three years, two months.

The FAA is ignoring an October 24, 1988, recommendation to install fire-and smoke-detection systems for the cargo compartments on airliners. In February of that year, eighteen passengers on an American Airlines DC-9 were injured when a drum of textile chemicals in the plane's cargo hold caught fire. In May 1996, a ValuJet DC-9 crashed, killing 110 people; the cause was a fire in the cargo compartment. An early warning of smoke or fire on board the plane could have prevented the tragedy. In November 1996, the FAA announced its intention to require smoke and fire detectors. In December 1996, the airlines announced at a White House ceremony that they would begin installing them voluntarily. Yet nothing has been done. The Air Transport Association, the lobbying arm of the major airlines, now says that airlines are reluctant to install devices without FAA guidelines. Elapsed time without appropriate FAA action: nine years, six months.

Overall, the Center found that of the 996 safety recommendations that the NTSB has issued to the FAA since 1991, only 491 were considered by the NTSB to be closed with appropriate actions taken. There are still 385 recommendations open; the Center found that these recommendations to improve safety have been awaiting FAA action for an average of 563 days—just over a year and a half. So it should come as little surprise that the FAA didn't adopt a 1990 rec-
ommendation by the NTSB to require safety seats for infants flying with their parents. In this case, the FAA has some measure of comfort: It's not alone in its dereliction of duty. Congress was a willing accomplice.

In October 1993, Members of the House of Representatives met to debate and vote on the Aviation Infrastructure Investment Act. The legislation, which enjoyed bipartisan support, authorized the spending of $6.5 billion over three years to renovate older airports around the country and to build new ones. Democrat James Oberstar of Minnesota, then the chairman of the House Public Works and Transportation Subcommittee on Aviation, went before his colleagues to make the point that spending money on airports created jobs and stimulated business. "For every $1 billion invested in airport development," Oberstar said, "we can count on an additional $3 billion in economic benefits and 40,000 to 50,000 jobs." (Oberstar did not mention, nor perhaps should he have been expected to, his status as the House of Representatives' number-one recipient of campaign contributions from aviation interests.)

Bud Shuster of Pennsylvania, the committee's top-ranking Republican, weighed in with his support. This was a rare opportunity, he told his colleagues, for Congress to spend some big money without voting for new taxes and without adding to the federal budget deficit. The money for airport projects, Shuster explained, would come from the Aviation Trust Fund, a special account replenished with various taxes on airline tickets, jet fuel, and air freight. Representative Jay Kim, a Republican from California, chimed in with his approval. "It's the kind of constructive, affordable progress that the American public wants to see from Congress," he said. The only real debate seemed to be among lawmakers who wanted to make sure that the FAA would be spending some of the money on airports in their respective districts.

But then Republican Jim Lightfoot of Iowa dampened the congratulatory ambiance on the floor of the House by rising to offer an amendment that would have required the use of safety-restraint devices for all child passengers on commercial aircraft. As Lightfoot pointed out, everything in a plane—passengers, crew, even carry-on luggage—had to be securely restrained during takeoff and landing. Everything, that is, except children. Nearly every state in the nation had laws requiring children in automobiles to be restrained in safety seats, but there were no such rules for air travel, where the forces in a crash were potentially far greater. "Under current FAA regulations, infants under the age of two may sit in the lap of the parent and must take his or her chances that
it will be a smooth flight," Lightfoot said. "Sadly, despite aviation's enviable safety record, our tiniest passengers have been put at needless risk."16

The issue—the risks to children traveling on airplanes—wasn't new. An estimated 10,000 "lap children" were flying on planes every day,17 and since the early 1960s the FAA had been conducting research on the hazards they faced.18 In 1978, after a United Airlines crash in Oregon in which two infants and a small child were killed, the NTSB requested that the FAA re-examine its child-seating guidelines.19 Four years later, the FAA decided to allow parents to use child-safety seats on planes—up until that point, they had not been permitted to do so—and it approved some seats that had been designed for use in automobiles. But the FAA stopped short of requiring the use of child-safety seats, as the NTSB had been urging.20 From 1987 through 1990, three more lap children were killed in airplane crashes that they might have survived had they been restrained in safety seats.21

One of the most horrifying incidents was the 1989 crash-landing of a United Airlines jet in Sioux City, Iowa. A passenger on the flight had assumed the "brace" position, leaning forward with her 23-month-old child between her legs, as she had been instructed to do; on impact, the woman was jolted upright only to watch her son's body flying down the aisle. In the smoke and fire following the crash, she wasn't able to find him, and he died of asphyxiation. Another mother on the flight felt her eleven-month-old daughter fly from her grasp.22 The child was flung into an overhead luggage rack fifteen feet away; a fellow passenger heard the child's cries and rescued her from the burning wreckage. "Imagine the sickening feeling of realizing our baby was being sucked out of my grasp as the plane flipped over," the child's mother later recalled. "There has never been such a feeling of helplessness and terror in my life."23

The circumstances of the Sioux City tragedy were so shocking that even the airline industry changed its long-held position and began asking the federal government to require that children fly in safety seats. Yet the FAA continued to resist, even though it knew from experiments with crash-test dummies at its own Civil Aeromedical Institute24 that it was almost impossible for a parent to hold on to an infant when a plane went down. ("There is no way that any human being could hold a child during the kind of crash forces that you would see during an accident," an FAA expert conceded. "Schwarzenegger couldn't do it." 25)
IN THE UNLIKELY EVENT...

Survival Laboratory, admitted during an NTSB hearing on the 1994 Charlotte crash. "Schwarzenegger couldn't do it."
25) Citing a study by two professors of business at the University of Maryland, the FAA argued that if parents were required to buy tickets for their children so that they could sit in safety seats, fewer families would fly and instead would opt to drive, which, after all, was statistically more dangerous.

Congress had been just as stubbornly resistant when Lightfoot, tiring of the FAA's recalcitrance, introduced legislation in 1990 to require the use of safety seats. Representative Bob McEwen, a Republican from Ohio, sounded a common note among the bill's opponents when he said, "No one knows how many infants have survived air crashes without child restraints." Representative Pete Geren, a Democrat from Texas, argued that parents needed to be able to comfort their babies during takeoff and landing. Instead of a safety seat, he suggested that the federal government look into the development of a "superreinforced 'snuggly'" that would hold children to their parents' bodies. "It doesn't seem to me that we're talking about rocket-scientist technology," he said. It was left to Susan Coughlin, the second-ranking official of the NTSB, to explain to Geren that such devices weren't even allowed in cars, because the child was likely to be crushed by the parent's body when it lurched forward during a crash. Lightfoot's proposal didn't make it out of the House Public Works and Transportation Subcommittee on Aviation. And when he and Representative Jolene Unsoeld, a Democrat from Washington, reintroduced the legislation in the spring of 1993, the aviation subcommittee gave it the same treatment.

Now, in October 1993, Lightfoot and Unsoeld were trying again. Unsoeld rose to make a plea: "All we are asking is that children under the age of two be given the same protections as you or I. Please support the youngest and most vulnerable of your constituents."

Then Oberstar rose to address the House. "I do not think it makes sense to require families to pay out an awful lot of money," he told his colleagues. Instead, Oberstar offered an amendment requiring airlines to provide safety seats only in cases where parents asked for them and agreed to buy a ticket for
their child—a policy that many airlines had already adopted. If the parents declined to pay for an extra ticket, the airlines could still allow them to hold their children on their laps. Oberstar argued that his proposal would preserve the parents' freedom of choice. Shuster rose to support Oberstar's amendment. "The anecdotal evidence here is always touching, wrenching, when we talk about anybody being killed, particularly infants," Shuster said. "But I would remind my colleagues that we charge the FAA with the safety provisions. It is up to the FAA to set these standards."

In the end, the House sided with Oberstar and adopted his amendment by a vote of 270 to 155. (Lightfoot and others introduced similar legislation again in 1995 and 1997, to no avail.) The measure avoided, as Oberstar put it, "forcing or imposing a requirement on the airline and upon all the traveling public at great cost, with rather minimal benefit." One such minimal benefit might have been the life of Danasia Brown, whose mother later lamented that, had she understood the risk to her daughter, "I would have paid for her to sit in a seat." Once again, Congress had compromised the safety of the flying public, just as it had been doing for sixty years.
At 8:31 p.m. on July 17, 1996, TWA Flight 800 was twelve minutes into its flight from John F. Kennedy International Airport in New York to Paris when it vanished from controllers' radar screens. Suddenly, a pilot in another jet in the vicinity radioed to an air-traffic controller. "We just saw an explosion up ahead of us here," the pilot said, his voice tense with emotion. "About 16,000 feet or something like that. It just went down—in the water." The controller tried radioing the TWA jet and got no answer. Moments later, the pilot struggled to further describe what he had seen: "Yes, sir, it just blew up in the air, and then we saw two fireballs go down to the water." The wreckage-strewn waters of the Atlantic, searching in vain for survivors among the 230 people aboard. Across a stunned nation, many assumed the worst—that madmen of the sort who had bombed the World Trade Center in 1993 and the Alfred P. Murrah Federal Building in Oklahoma City in 1995 had struck again with a bomb or a missile. There was an outcry for stricter measures against terrorism.

In the months that followed, crash investigators worked around the clock, painstakingly studying the 95 percent of the 200-ton plane that they'd been able to recover from the Atlantic Ocean. In a hangar, they reassembled a massive 900-piece, 60,000-pound portion of the aircraft, the largest such reconstruction ever attempted. They pored over the aircraft's maintenance records, sent parts off to laboratories for analysis, and filled fifteen binders with data on arcane subjects such as soot patterns. The NTSB leased another 747, rigged it with sensors, and flew it on a flight that closely emulated that of TWA Flight 800, and dissected yet another 747 of a vintage comparable to the downed jet's to examine wear and tear on parts. Crash investigators detonated explo-
sives inside a 747 cargo hold and on the center-wing fuel tank and compared the sound with that of TWA Flight 800's cockpit recorder tape.\(^7\)

Gradually, they began to discount the possibility that the disaster had been an act of terrorism. "Every piece was thoroughly examined for evidence of an explosive device," Alfred Dickinson, the NTSB's lead investigator, explained at a public hearing in December 1997. "None was found."\(^8\) Yet other hypotheses— that the airliner had been struck by a meteor, for example— were examined and ruled out.\(^9\)

Instead, investigators suspected that a malfunction inside the plane had caused vapor in the center fuel tank to ignite and explode.\(^10\) Data from the emulation flight showed that the fuel-tank temperature had risen after takeoff, and research by Joseph Shepherd, an aeronautics professor at the California Institute of Technology, and others revealed that aircraft more vulnerable to such explosions than had previously been believed: with an increase of 60 degrees Fahrenheit in the fuel tank, the chance of an explosion from a spark went up by a factor of 100,000.\(^11\)

But where had the spark come from? Investigators turned their focus to the plane's electrical system.\(^12\) The quest for the deadly flaw in the jet's 150 miles' worth of wiring was maddeningly difficult— "It's a needle in a haystack," one expert complained— and even by the time of the public hearing sixteen months after the crash, the NTSB still had not pinpointed the cause.\(^13\) Nevertheless, the hearings and documents released by the NTSB contained troubling revelations— among them, that the 25-year-old jet contained a type of wire that had been removed from military planes in the early 1980s because of its tendency to deteriorate and create dangerous sparks.\(^14\) And as the NTSB discovered, TWA Flight 800 was not the only airliner with damaged wiring. In April 1998, the agency urgently called upon the FAA to inspect hundreds of other U.S. airliners for potentially unsafe wires.\(^15\) That news made headlines around the world but told only part of the story: The FAA— and Congress— had had warnings about the risk to airline passengers for more than a decade but had chosen not to act.

TWA Flight 800, like scores of other U.S. airliners, was an aging aircraft. Built in July 1971, the Boeing 747 was five years past its intended life span of twenty years and had flown 90,000 hours— 30,000 more than its envisioned use.\(^16\) In that sense, however, it wasn't particularly unusual: In 1996, approxi-
mately one of every four U.S. airliners was more than twenty years old, and 500 planes were at least the same age as Flight 800. These planes stayed in use because, in the aftermath of deregulation, there was an increased demand for planes, and pressure to keep costs down made it more economical to keep older aircraft in service than to replace them.

These aircraft, however, carried risks. In 1988, a nineteen-year-old Aloha Airlines Boeing 737 was flying at 24,000 feet on an inter-island flight over Hawaii when the metal surface of the airplane suddenly cracked and peeled away, leaving an eighteen-foot hole in the roof. A flight attendant was sucked out of the aircraft to her death, although the plane's other occupants escaped without injury and the plane was able to land. As a result, Congress passed the Aging Aircraft Safety Act of 1991, which mandated a schedule of inspections of aging planes. One of the bill's sponsors, Representative Robert Roe, a Democrat from New Jersey, said that the law was intended "to assure the traveling public that the highest standards of safety will continue to be maintained."\(^\text{18}\)

The new law and the inspections subsequently required by the FAA focused on spotting corrosion and metal fatigue. Unfortunately, however, the hull of an aircraft isn't the only part prone to deterioration. A paper presented in July 1997 at "The First Joint DoD/FAA/NASA Conference on Aging Aircraft" in Ogden, Utah, offered this sobering assessment: "The susceptibility of aging insulation to rupture by smaller and smaller stresses means that in aging aircraft the wiring will be increasingly prone to unexpected failure. . . . In our opinion, the informal level of wiring problem reports we receive indicate[s] to us the insulation structure gradual deterioration process is placing our aging aircraft in a state where we will see more and more unexpected wiring failures."\(^\text{19}\)

(Amazingly, the FAA apparently doesn't even see wiring as part of an airplane's structure. "The aging plan has been primarily structural in nature," David Hempe, the manager of the FAA's aging aircraft program, told the Center. "Wiring is not in the purview of my little program area.")

In the case of TWA Flight 800, evidence gathered by investigators suggests that despite regular servicing, the plane was plagued by subtle malfunctions in its electrical system. The aircraft's scavenge pump, which removes leftover fuel from the fuel tank, had been replaced a few months before the crash,\(^\text{20}\) yet the low-pressure indicator light continued to give erratic readings right up until the plane's crash. (According to the cockpit tapes, in the minute before the explosion, the flight crew complained of "that crazy fuel-flow indicator there on number four."\(^\text{21}\))

When investigators examined the wreckage, they found that the plane's
In the unlikely event...

wiring was plagued with numerous cracks. In a report submitted at the hearings, they noted that "the wiring from the scavenge pump relay was found to have deeply hot-stamped wire markings and a crack was propagating from a numeral '1' [stamped on the wire]. It was found that the crack penetrated the inner layer of insulation to the core conductor." At the December 1997 hearings, experts stopped short of a definite conclusion but theorized that a spark from a damaged wire may somehow have caused the explosion. "We are looking at the possibility of a short circuit to wires," Robert Swaim, a systems expert with the NTSB, testified.

The wire in the 747 was a type known as Poly-X, which itself had a troubled history. In the early 1970s, Poly-X's light weight, stiffness, and other qualities made it a staple in airliners manufactured by Boeing and McDonnell Douglas. Within a few years, however, both aircraft manufacturers started noticing problems with Poly-X's durability. In 1974, Boeing noted abrasions on the wire's insulation in bundles installed in high-vibration areas; two years later, McDonnell Douglas also noticed cracks in the insulation, apparently caused when the identification stamp branded on the wire (the same type of "hot-stamped wire markings" that would be noted many years later in the TWA Flight 800 investigation) came into contact with cleaning solution. In 1979, FAA inspectors discovered that fuel-pump wire abraded by vibrations had caused a fuel leak in a 747. The agency issued a directive instructing airlines to wrap Teflon tape around the wiring to protect its insulation from being worn away.

At the NTSB's hearings on the TWA Flight 800 disaster, industry representatives maintained that they'd never experienced anything other than minor problems with Poly-X. "We have no record of any incident of arc tracking [current passing over insulation surface between wires] taking place on any of the wires on any of these airplanes [747s with Poly-X wire]," Alex Taylor of Boeing testified. Ken Craycraft, a TWA maintenance engineer, offered similar assurances to the board. "The wiring on the 747 on the TWA fleet has not really been a continuing problem area," Craycraft testified. "The odd time we would have an individual system that will have a chafed wire, and oftentimes that is because of a broken clamp or something of that sort, that will allow a wire bundle to sag against structure and chafe. The result there is either you get a false indication of a light in the cockpit, or a system will not work, or you will pop the circuit breaker, depending upon the extent to which the wire is contacting the structure. . . . That has been most rare as far as the 747 is concerned, that we have not had the problems with the Poly-X wire."

The U.S. military, however, had documented problems with Poly-X, going
back nearly two decades. In the early 1980s, the U.S. Navy discovered that Poly-X wire was deteriorating so rapidly that it was causing equipment failures in its F-14 jets, and in 1982 it got Congress to appropriate $354 million to replace the wiring in its fighter fleet. "The problems with Poly-X wire are well known to headquarters, and its use has been curtailed," Donald Eaton, the commander of the Naval Air Systems Command, wrote in a 1982 memo to a group of electrical manufacturers.

Problems with cracked and damaged insulation, however, weren't unique to Poly-X. At the same time that the military became wary of Poly-X, it discovered dangerous problems with its successor, known by the shorthand Kapton, which deteriorated when exposed to moisture, giving off sparks that could cause fires. (Kapton is E.I. du Pont de Nemours and Company's trade name for the polyimide film that's used as insulation for the wire.) "The maintainability and durability aspects in many of our current aircraft wiring systems have been compromised by the use of polyimide-type wire, i.e., Poly X . . . and Kapton," Eaton wrote to McDonnell Douglas in 1981. The military stopped using Kapton as well, although not soon enough. In 1986, two Navy pilots were forced to eject from an EA-6B jet off the California coast, after a fire broke out in the rear equipment compartment; investigators found that the plane's Kapton wires had arced and burned, possibly causing the crash. The following year, a Navy official wrote to the Defense Industrial Supply Center: "The Navy and Marine Corps are discontinuing the use of Kapton-insulated wire in future aircraft replacements or repair actions."

Internal Navy documents obtained by the Center for Public Integrity illustrate how much—rather than how little—was known about Kapton-insulated wiring. One document, the outline for a briefing on Kapton wiring, includes a long list of its "disadvantages," including these:

- "chars (carbonizes) at extremely high temperatures"
- "experiences 'flashover failure' ('wet wire fire')"
- "water causes hydrolytic degradation, embrittlement; other agents may do same"
- "uv [ultraviolet light] causes degradation"
- "flexing/vibration may cause cracking"

The briefing paper goes on to conclude: "The U.S. Navy has experienced

Patrick Price, a retired Boeing engineer who worked on the BMS 13-60 project, said that what he knew about wiring so alarmed him that he wouldn't let his children and grandchildren fly in any jet built before 1992.
major problems with virtually all Kapton/Poly-X wired aircraft."

The presentation also dwells at some length, in a section titled "TWA Incident," on the circumstances surrounding an electrical fire in the cockpit of a TWAL-1011 en route from St. Louis to Kansas City on May 27, 1983. It notes that the aircraft in question was out of service for three days to repair the damage resulting from faulted wires. "TWA has experienced more than thirty other instances of polyimide-film-insulated wire failures with consequential multiple wire damage," it says, quoting a report on the incident prepared by TWA engineers. "The extensive repair requirements usually resulted in a lengthy delay, cancelled flight, or plane out of service for one day or longer. No conventional wiring installation is invulnerable to short-circuit failure, so it is important to select 'fail friendly' wire types that will not produce extensive wire-bundle damage when they do fail. Polyimide-film-insulated wire on TWA aircraft has consistently demonstrated a failure mode requiring far more aircraft out-of-service time to repair than has been experienced for other types of wire."

TWA, in fact, had been concerned about wiring problems on its aircraft as early as 1977.

In a letter dated June 30, 1977, W.B. Clark, the director of electronics engineering for the airline, wrote to Jack Miller, the executive in charge of 727 customer engineering at the Boeing Company, that TWA was concerned about the wiring that Boeing proposed to install in its new 727s. Clark noted that TWA was "concerned about such an application because of our experience with Kapton-insulated wire on the L-1011."

But perhaps the most telling section of the internal Navy document is one titled "Civil User Problems." It notes that "United Airlines will not use Kapton in swamp [severe wind and moisture problem] areas." Under the heading "Other Airlines Hesitant to State Policy," the presentation lists these two points: "Rewiring program financially crippling" and "Admission that polyimides [polyimide-insulated wires] are inferior could bring about unwanted lawsuits following an accident."

In 1982, Air Force Captain Ted Harduvel, a graduate of the USAF’s elite "Top Gun" Fighter Weapons School in Nevada and a top-rated F-16 instructor, crashed into the mountains of South Korea while on a training flight. Initially, the official explanation for his death was pilot error, attributed to the side effects of an antibiotic that Harduvel had taken several days before the flight.
The pilot's wife, Janet Harduvel, subsequently filed suit against the aircraft's manufacturer, General Dynamics. During the trial, it was revealed that Harduvel's F-16 suffered repeated problems with electrical instruments that malfunctioned only when the plane was flying, and that military maintenance records contained 138 instances from 1978 to 1982 in which wire chafing was shown to be a problem with other F-16s.\(^3\) The single-seat fighter owes its nickname—the "Electric Jet"—to thirteen miles of electrical wiring, a space-age bank of electronically controlled bank of flight and navigation instruments, and the absence of mechanical linkages between flight controls and control surfaces. Mrs. Harduvel's attorneys argued that Harduvel's F-16 crashed because a short-circuit in the wiring knocked out the jet's crucial navigation gear, including his primary attitude indicator—the instrument that tells pilots when they are right side up or upside down, climbing or diving. They found that the plane was only 75 hours old when it crashed but had already been worked on 43 times, and that six of the problems reportedly involved instruments that malfunctioned only when the plane was flying.

"The electrical failure was consistent with Kapton," one of Mrs. Harduvel's attorneys, Howard Acosta of St. Petersburg, Florida—himself a naval reserve pilot—told the Center in a 1996 interview. "It was a propagating short." Propagating short is another term for arc-tracking.

A jury awarded Mrs. Harduvel $3.1 million in damages, but the verdict eventually was set aside by an appeals court that decided the military's design specifications, rather than General Dynamics' workmanship, was to blame.\(^3\)

Documents obtained by the Center for Public Integrity show that the debate within the military over Kapton wire was at times intense. In a memo to his superiors written on February 26, 1986, Air Force Colonel John Reynolds wrote: "We are taking a hard look at a recent Navy revision to Mil-W-5088 which covers aircraft wiring. The Navy revision drops Kapton wire from the spec. There is a lot of politics surrounding this issue, with heavy hitters from DuPont weighing in in Washington."

The enormous costs to the federal government associated with wiring failures were all but invisible to those on the outside. In January 1989, the Navy's Fleet Readiness Engineering Branch at the Naval Avionics Center in Indianapolis, after examining "comparative failure/maintenance data on wiring systems" for 3,158 fixed- and rotary-wing aircraft, issued a report whose chief findings were nothing short of shocking. In the one-year period beginning on July 1,
1987, the report found, the Navy had experienced a total of 143,641 wiring failures, with only 11.4 mean flight hours between failures. In all, the report said, the Navy spent 807,418 man-hours on unscheduled wiring maintenance, representing 8.6 percent of all aircraft maintenance man-hours. The typical aircraft in the Navy's fleet averaged 0.94 flight hours per day and 0.72 unscheduled wiring-maintenance man-hours per day.

Little wonder that in April 1992, scientists at the Air Force's Aeronautical Systems Center at Wright-Patterson Air Force Base in Dayton, Ohio, could begin a report on a new wire product with a virtual indictment of the old:

"A typical fighter aircraft contains over twenty miles of wiring and a bomber over 150 miles of wiring. During the last twenty years, polyimide or Kapton tape (M81381) insulation construction has been used as the primary wiring insulation for aircraft and space vehicles. . . . Current Air Force policy dictates that M81381 will not be the insulation of first choice. This policy was arrived at based on the identification of several major problems with the M81381 construction. The problems identified by maintenance personnel and verified by laboratory testing included: catastrophic insulation flashover; degradation of mechanical properties during in-service use; excessive time to repair; and other problems caused by excessive wire stiffness. When M81381 insulation is damaged, exposing the wire conductor to the environment, electrical arcing can result, which carbonizes the polyimide insulation. The carbonization can rapidly propagate the arcing to adjacent wiring, resulting in catastrophic damage to wire bundles, as easily demonstrated by laboratory test."\(^{40}\)

If the military's problems with wiring in the mid-1980s weren't enough to get Congress's and the FAA's attention, commercial aircraft were having problems as well. A 1987 Air Force memo noted that "three . . . instances of wet-wire arc tracking/flashover failures have been documented in commercial aircraft. Two of these instances involved Kapton insulation."\(^{41}\) In 1985, a Boeing 757 owned by Monarch Airlines, a British carrier, was on its way from the Canary Islands to England when passengers and crew heard two loud pops and then watched in alarm as the cabin filled with smoke. The plane lost all main electrical power but was able to limp on its backup electrical system to an emergency landing in Portugal. The problem: Fluid from a leaking toilet had dripped onto a defective wire bundle.\(^{42}\) The following year, a TWA jet experienced a similar wire failure.\(^{43}\) Boeing was sufficiently put on the alarm by the Monarch accident that it sent a team into the lab to create its own new type of wire, BMS 13-60, which sandwiched Kapton insulation between layers of Teflon to make it safer.\(^{44}\)

Despite the raft of problems with both Poly-X and Kapton, the wiring
remained in airliners. Patrick Price, a retired Boeing engineer who worked on the BMS 13-60 project, later told The News Tribune of Tacoma, Washington, that what he knew about wiring so alarmed him that he wouldn't let his children and grandchildren fly in any jet built before 1992.45 The FAA was slower to react. When an FAA official named Pete Kochis warned his superiors in 1986 that Kapton wire could become the equivalent of the booster seal that had caused that year's Challenger space-shuttle disaster, the agency apparently shrugged the warning off.46

In 1988, the Fort Worth Star-Telegram published a three-part investigative series by reporter Stan Jones on problems with Kapton. Although the series and a subsequent article by Jones for The Washington Monthly dealt mainly with the military's extraordinary problems with wiring, Jones detailed problems with airliners as well. According to Jones, for example, TWA reported 22 instances of wire fires or arcing on its fleet of 30 L-1011 jetliners from 1972 and 1981.

Subsequently, Congress finally made some inquiries. Democrat John Dingell of Michigan, then the chairman of the House Energy and Commerce Subcommittee on Oversight and Investigations, wrote to the FAA, asking for the agency's response to an Associated Press article implicating Kapton in aircraft fires.47

Dingell wasn't the only one asking the FAA questions about Poly-X and Kapton wiring. On May 25, 1992, John Anderson, Jr., the GAO's associate director for transportation issues, wrote to the FAA with a number of questions about the electrical wire used in commercial transport airplanes. More than three months later, the FAA responded. In a letter to Anderson dated August 27, 1992, Ronald Wojnar, the manager of the FAA's Transport Airplane Directorate, said that the FAA was "unaware of any evidence that defective wire insulation has caused or contributed to any commercial aircraft accidents or deaths." Then, in language that was in marked contrast to virtually everything known within the U.S. military about polyimide-insulated wiring, he went on to assert: "When considering the total amount of wire in the fleet and the number of years these aircraft have been operating, the performance of civil transport aircraft wire insulation has been exemplary. These types of wire have been in use on most large commercial airliners in the United States and Europe for many years, and have contributed to the achievement of tens of millions of hours of safe flight."48
Wojnar then pointed out that federal aviation regulations "call for specific burn tests for aircraft wiring in order to meet a minimum fire safety standard, but beyond that, there are no specific requirements for toxicity, flammability, or arc-tracking (notch propagation)." Most strikingly, he continued, "The extensive performance experience with both types of wire insulant in the world's commercial aircraft fleet shows no reason for concern or action by the FAA." (Emphasis added.) He concluded, "It is no exaggeration to say that there are millions of feet of electrical wire insulated with Kapton flying millions of miles per year with a problem/incidence level close to nonexistent."

The NTSB's response to an identical letter from Anderson was more revealing. "The Safety Board is familiar with the characteristics of Kapton and some of its history in aircraft and spacecraft . . . and it was used in the space shuttle program," Susan Coughlin, the NTSB's acting chairman, replied in a letter dated June 24, 1992. "Although hazards associated with Kapton eventually led to the rewiring of the space shuttle, those same problems have not surfaced in commercial aircraft, according to FAA service difficulty reports or data maintained by major U.S. manufacturers of commercial aircraft."49

In May 1990, an accident eerily presaged TWA Flight 800: In Manila, a Philippine Air Lines Boeing 737-300 exploded and burned on the ground shortly after its push-back from the ramp. Of 199 persons on board, eight were fatally injured and thirty received serious injuries. The airplane was destroyed by fire.50

The investigation found no evidence of a bomb, an incendiary device, or sabotage. "Preliminary evidence," the NTSB report said, "indicates that ignition of the fuel-air mixture in the center fuel tank was the cause of the explosion and subsequent fire."

The report went on to say: "Examination of the 28-volt direct current power wires for the float switch, which lead from the center [fuel] tank to the refueling panel on the right wing, disclosed an area approximately 3/87 inch long in which the wire insulation had been compromised and the conductor was exposed. . . . Examination of the wire bundle in the vapor seal revealed several other wires that had damaged insulation and exposed conducting material, including a wire powered by eleven-volt alternating current. Further examination of the wire bundles for both the left and right wings found numerous areas in which wire insulation had been damaged. . . . It is possible that the combination of a faulty float switch and damaged wires providing a continuous power supply to the float switch may have caused an electrical arc or overheating of the switch leading to the ignition of the center fuel-tank vapor."51

The NTSB was sufficiently alarmed by the findings of the investigation that
it urged the FAA to inspect the wiring on all 737s in the U.S. commercial fleet. The FAA, however, didn't heed the request. Instead, even as it quietly studied whether or not to bar Kapton wire, the agency continued to assure Congress that there was nothing to worry about.

Patrick Price, who worked for Boeing at the time, recounted his work on the company's post-accident investigation in a letter he sent to the NTSB, the FAA, and four Members of Congress in early 1998. "I was given various sections of wire bundles that were involved in aircraft incidents and accidents, including the 737-300 in Manila in May 1990 [in which] the fuel tank exploded," he wrote. "I evaluated a portion of that wire bundle and it showed evidence of 'arc tracking' as the ignition source. I was told to keep my findings to myself by Boeing engineers."

Soon after the NTSB recommended that airline operators inspect the wiring on certain 737s and 747s, the Center for Public Integrity asked the Boeing Company for its position on the issue. "There have been no past reports pointing to wiring," Tim Niall, a spokesman for Boeing, said. "I cannot think of another incident when wiring was thought to be suspect. I must point out that—and the NTSB made this clear as well—they have yet to come to any definitive conclusion. Nothing is for certain."

Three months after the Boeing 737 incident in Manila, the U.S. Coast Guard suddenly found itself in the vortex of the controversy over aircraft wiring.

It was twenty minutes after midnight on August 24, 1990, and a Coast Guard E-2C Hawkeye soared through the darkness along the eastern coast of Puerto Rico. The turboprop radar-surveillance plane, on loan from the Navy, and its four-man crew had just finished a patrol over the Caribbean in search of drug-smuggling aircraft, and was heading home to Roosevelt Roads Naval Station. The weather was good, with a 2,000-foot cloud cover, a light wind, and ten miles of visibility to the naval station's runway. For the Hawkeye's two experienced pilots, it should have been a routine landing. Instead, military air-traffic controllers got an urgent radio message: The plane was on fire.

In the smoke-filled, depressurized cockpit, the pilots struggled to bring in the crippled plane. One of the Hawkeye's two engines, the one on the left wing, had failed, but they still had a chance; through the windscreen, they could see the naval station's runway, just three miles in the distance. Digging deep into their courage, they guided the plane down, flames shooting from the left side of its fuselage, for what witnesses would describe as a nearly normal, straight-in
approach. But the fire had burned through the leading edge of the left wing, reducing its aerodynamic capabilities. As the Hawkeye swooped down toward the macadam, at 600 feet altitude and just three-quarters of a mile short of the runway, the crew reported that they were "losing it." The plane veered sharply to the left, and a half-mile short of the runway it slammed into the earth. The force shattered the aircraft, and witnesses recalled that burning pieces scattered across the 11,000-foot runway. All four crewmen were killed.

It was the Coast Guard's first aviation casualty in the war on drugs. But narcotics traffickers, malevolent as they might be, weren't to blame for sending the four aviators to their deaths. Instead, according to the official report on the crash, which the Center obtained through the Freedom of Information Act, the culprit apparently was a piece of damaged wire. A spark from the wire's chafed insulation "either caused a pinhole leak in a hydraulic line or caused a small explosion by igniting leaking/residual (trapped) fuel/hydraulic fluid which ruptured a hydraulic line."

The Coast Guard's official "decision letter" on the crash provides a clinical—yet nonetheless chilling—account of the events that followed the "small explosion" and sent the E-2C Hawkeye, "in a near vertical attitude," into the earth:

"A hydraulic-fluid-fed fire occurred in the left side of the center wing root area, an area inaccessible to the crew for fire-fighting purposes. The fire burnt through the pressurize fuselage, resulting in the loss of pressurization and, once pressurization was lost, allowed smoke and fumes to enter the cabin/cockpit area. Fire heat increased the impedance of the VHF-AM antenna, resulting in the 'breaking up' of radio communications. The fire damaged/shorted electrical wiring, which resulted in the uncommanded shutdown of the left engine."

The Coast Guard's assessment of the total direct cost of the accident: "$32,834,000.00, derived from personnel cost of $3,570,000.00 and government (non-Coast Guard) property cost (NAVY E-2C) of $29,264,000.00."\"55

On February 24, 1989, United Airlines Flight 811 was cruising at 23,000 feet over the Pacific, fifteen minutes after its takeoff from Honolulu. Suddenly, the plane's passengers heard a loud thump and felt a tremendous shock. The plane's forward cargo door had opened, and pressurized air rushed out of the cabin with the terrible force of a hurricane. Nine passengers—including Lee Campbell, a 24-year-old business executive from New Zealand—were sucked out of their seats to their deaths.56

Initially, the NTSB ruled that the airline and the ground crew were at fault,
supposedly for failing to repair a door latch and to secure it properly. But Campbell's father, Kevin Campbell, wasn't satisfied with that explanation. He and his wife, Susan, spent several years examining thousands of pages of records and interviewing survivors and flight crew. They developed an alternative theory: that an electrical malfunction had caused the door to open.

Then, in 1991, at New York's Kennedy Airport, a stray electrical signal from chafed wires unlatched and lifted the aft cargo door on another United Airlines 747. Eventually, in 1992, after a Navy unmanned submarine craft had descended into the depths of the ocean and retrieved the door so that experts could examine it, the NTSB concluded that the Campbell had, in fact, been right.

Photographs of wiring from the door show cracked insulation, and the NTSB's report notes that the cracks "could have allowed short circuiting and power to the latch actuator." Although there was no conclusive evidence that arcing had occurred, the NTSB noted that "all of the wires were not recovered, and tests showed that arcing evidence may not be detectable."

In the mid-1990s, Congress had ample additional warnings about the dangers posed by aircraft wiring. Ed Block, a former wiring specialist with the Defense Logistics Agency, contacted several Members of Congress to seek assistance in a dispute over his 1983 firing. Senator Rick Santorum and Representative James Greenwood, both Republicans from Pennsylvania, wrote letters on Block's behalf to the Pentagon. No one, however, picked up on the charges that Block was making about the dangers of Poly-X wire, the issue that he claimed had led to his dismissal from his military job. Without congressional muscle behind him, Block couldn't do much to pressure the FAA to act. In December 1994, the agency brushed off a Block warning on Poly-X, telling him, "To date, the FAA has not found cause to have any modern type wire removed because of performance," and blithely ignoring the fact that the military had ditched both Poly-X and Kapton for just that reason. (Block also struck out with the NTSB, which informed him in February 1996 that it had consulted FAA databases and found no problems with Poly-X among the 908 entries on wiring problems in aircraft over the previous decade.)

In April 1997, Greenwood arranged a meeting for Block with representatives of the FAA, the GAO, and the FBI to once again discuss his concerns about wiring in airliners. It would take more than another year, however, for the FAA to finally acknowledge the clear and present danger posed by the wiring in many commercial aircraft.

On May 7, 1998, the FAA issued urgent orders to airlines to inspect and possibly replace "fuel-tank wiring insulation" in certain Boeing 737s, 747s, and
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767s. In announcing the orders, the agency said that they were intended "to detect and correct chafing of wire insulation inside conduits installed in the fuel tanks" of the Boeing planes. "Chafing could expose the wires and potentially lead to electrical arcing that might penetrate the conduit, resulting in a possible fire or explosion of the fuel tank," the FAA's press release said.61

The FAA issued its orders, after being informed that electrical arcing from wiring in the wing tank of a Continental Airlines plane had burned holes in the surrounding conduit and allowed jet fuel to enter. The agency's safety engineers had long insisted that such arcing would trip a circuit breaker before it would burn through the conduit, but, as one newspaper account put it, "they have been proved wrong."62

The FAA's Thomas McSweeny, who briefed the news media on the agency's orders, had taken an entirely different position more than a year earlier in the closed-door meeting convened by Representative Greenwood. He and about thirty others were present, including several from the U.S. Navy, which had gone to extraordinary lengths to get rid of both Poly-X and Kapton wiring. McSweeny was asked how such wiring could be judged a safety hazard on military planes but not on commercial aircraft.

He responded to this and several related questions with the same four-word challenge: "Show me the data."

On September 8, 1994, USAir Flight 427, on its initial approach to Pittsburgh International Airport, suddenly flipped upside down and screamed to the earth at a speed of 300 miles per hour. Investigators never determined what caused the Boeing 737 to spin out of control, killing all 132 people on board. The NTSB has theorized that something made the plane's rudder swing far to the left and freeze, tossing the plane into an uncontrolled tumble.

Similar problems—with nonfatal results—have been described by pilots of other commercial aircraft, all documented in the FAA's own database of Service Difficulty Reports, which tracks maintenance records for the entire U.S. passenger fleet. Mike Goldfein, a reporter in the Washington bureau of A.H. Belo Broadcasting Corporation, studied 5,690 of these reports covering the years 1974 to 1995, in connection with his own stories on the wiring issue. He found 2,093 wire-related problems, including 284 instances of uncommanded flight-control problems—that is, a plane in flight changing course seemingly by itself, without a command from the pilot.

The Seattle Times reported in November 1995 that, in the fourteen months
following the crash of Flight 427, pilots reported to the FAA no fewer than 45 instances of inadvertent, unexplained flight-control movements. On April 25, 1995, a Southwest pilot reported an abrupt uncommanded right-rudder movement. On September 25, 1995, a United captain reported that his autopilot initiated an uncommanded turn. On August 5, 1995, a USAir pilot reported that his plane shuddered, then rolled to the left. On July 18, 1995, a USAir pilot reported two uncommanded rolls to the left. In the last case, a leak in a toilet was suspected of causing a malfunction in the autopilot; the other incidents were not explained.63

In 1983, the Air Force, according to internal Defense Department documents obtained by the Center, requested funds to rewire their F-14A fighter jets, replacing Poly-X wiring with Kapton. The Air Force noted in its appropriation request that the wiring "had an abnormal insulation aging, embrittlement and cracking resulting in wire-to-wire shorts, particularly in the presence of water." The request went on to note, "Some of the wire and connector failures have been observed as spurious signals on control wires causing spoilers to stick in the up position, inadvertent autopilot commands and power shorts which disable the autopilot completely."

Those hazards—traced by the Air Force's experts on wiring—are no different from the hundreds of reports of uncommanded flight problems experienced by commercial pilots and reported to the FAA. Yet the FAA continues to maintain that aging, cracking, brittle wiring poses no threat to the safety of the flying public—a claim that, for McSweeny, is largely a matter of semantics. In the closed-door meeting in Representative Greenwood's office, after hearing example after example of the dangers posed by Kapton and Poly-X wiring, the FAA's top safety official answered with two words: "Define safety."

In the case of the President of the United States, defining safety has been a simpler issuer. In a 1996 interview, Greg Phillips of the NTSB told the Center that, because of concerns over Kapton-insulated wire, Air Force One had been rewired.
Outmoded seats and deteriorating or damaged wires aren't the only threats to the safety of the nation's airline passengers. A number of other conditions, both on the ground and in the air, are increasing the likelihood that airline mishaps will continue to affect thousands of travelers in the United States each year.

"Due to Circumstances Beyond Our Control . . ."

Outmoded, temperamental, and increasingly prone to outages, the air-traffic-control system has been the victim of repeated failures on the part of Congress to reform it. Since 1981, when the FAA announced that it would overhaul the system, Congress has spent $20 billion on a modernization program that will come on line, at the earliest, in 2003.

In the meantime, the FAA is importing vacuum tubes from Eastern Europe to keep the thirty-year-old computers that monitor air traffic running. Stanley Rivers, the deputy director of the FAA's Airways Facilities Service, which maintains the air-traffic-control system, described their condition to a reporter for the Austin American-Statesman in 1995. "Cables are brittle, vacuum tubes do not stand too much handling, circuit boards can break when flexed, and transistors can fail under the strain of testing," he said.

Some of the machines—notably, the IBM 9020e—are so old and outmoded that no one makes or sells replacement parts for them. The FAA used to have two extra 9020e's for training purposes; now it has one. The other had to be cannibalized for spare parts.
The National Air Traffic Controllers Association, a union, provided the Center for Public Integrity with data on computer outages — malfunctions that leave controllers without radar contact with the aircraft in their area — in the system from May through December 1996. There were a total of 599 outages, including 29 in Chicago, 36 in Cleveland, 39 in New York City, and 58 in Washington, D.C. Not all failures are total; sometimes controllers can still see jets on their screens but lose the background maps that provide their locations. At other times, the planes themselves disappear from the radarscopes. And sometimes, the screens go completely blank.

"...not all, of us have lost confidence in the equipment, and that says enough in itself," Andy Acres, who heads the traffic controllers' union in Washington, told a reporter for The Washington Post in 1997. The Federal Aviation Administration is importing vacuum tubes from Eastern Europe to keep the thirty-year-old computers that monitor air traffic running.

What went wrong?

After President Reagan fired striking air-traffic controllers in 1981, FAA officials envisioned coping with the loss of experienced personnel by using new technology that not only would require fewer controllers and save billions in labor costs but also would accommodate the projected growth in air traffic ushered in by deregulation. So the agency set out to build a state-of-the-art air-traffic-control system, which it estimated would cost $2.5 billion and would be completed in 1996. But instead of selecting one contractor, the FAA spent an extra $280 million paying two companies, IBM and Hughes Electronics, to design competing prototypes in the mid-1980s. By the time the FAA picked IBM in 1988, the projected cost of the system had risen to $4.8 billion and the deadline had been extended to 1998. But IBM had trouble writing the mammoth software package for the system, partly because of unrealistic technical specifications demanded by the FAA. (Originally, for example, the FAA stipulated that the system couldn't malfunction more than three seconds per year.) With poor oversight from the agency, the project spun out of control. By 1994, the projected cost of the new system had risen to $7.6 billion, three times the original estimate, and the deadline had been pushed back to 2003.
At that point, the FAA pulled the plug on the program and started over. (It "restructured," in bureaucratic parlance.) That meant scrapping $1.5 billion worth of completed equipment and software that couldn't be used. The FAA instead embarked upon a less ambitious plan, and since then it has scaled down its upgrades even further—eliminating, for example, the new computer workstations that it had planned to give to controllers in airport towers. Meanwhile, the FAA has budgeted $655 million toward interim projects to nurse the existing system along while it completes the upgrades. At this point, the FAA is projecting that the final components of the new system will be operational by 2005, nine years after the original deadline. The total cost of the project? Still perhaps as much as $7 billion, according to estimates by the General Accounting Office, the investigative arm of Congress.\textsuperscript{10}

"It is hard to understand why one of the most technically advanced countries, with nearly half the world's aviation traffic, is depending on 25- or 30-year-old equipment," Republican John Duncan of Tennessee, the chairman of the House Transportation and Infrastructure Subcommittee on Aviation, complained in 1995. Duncan blamed red tape in federal procurement regulations," and the following March Congress exempted the FAA from the rules that apply to other federal agencies, allowing it to award contracts without competitive bids.\textsuperscript{12}

But that move hasn't eliminated all the problems. The New York Times reported in March 1998 that controllers who have tried out prototypes of the new equipment complain about design problems: Functions that required only the twist of a knob now require numerous keystrokes, for instance, and the software opens windows on computer screens in a way that could hide critical information.\textsuperscript{13} As the GAO recently reported to Duncan's subcommittee, however, the FAA is again having trouble keeping one portion of the scaled-down overhaul—a $2.23 billion equipment upgrade for the Terminal Radar Approach Control (TRACON) facilities—within budget and on schedule.\textsuperscript{14}

\textbf{See No Evil}

In December 1985, an Arrow Air DC-8 crashed in Newfoundland, killing 256 passengers. Investigators subsequently found that the airline had numerous glaring maintenance problems—it had used adhesive tape, for example, to keep windows shut on the plane that crashed.\textsuperscript{15} Congress held hearings at which a former Arrow pilot accused the company of performing only "marginal maintenance."\textsuperscript{16} Somehow, FAA inspectors had missed spotting these problems.
What happened as a result of the congressional hearings? Apparently, nothing. In 1991, the GAO warned the House Public Works and Transportation Subcommittee on Aviation that inadequate inspections had been a contributing factor in six airline crashes and that Congress needed to do something about "fundamental and deeply embedded problems" in the inspection system. The FAA promised that a new computer tracking system would solve the problem.

Four years later, a special FAA team inspected Arrow again and found that the airline still had obvious problems that its regular inspectors hadn't uncovered, such as maintenance procedures that hadn't been followed and jets flown on hundreds of flights without FAA-required safety modifications. Maintenance workers didn't even have all the proper tools to work on planes. An FAA official told a reporter for The New York Times that the violations—so serious that they required a two-month shutdown of the airline—were the worst he'd seen in sixteen years with the agency. Amazingly, the inspectors who had originally missed the problems weren't disciplined by the FAA, or even required to undergo additional training.

But the problems ran deeper than Arrow. In April 1996, the Senate Governmental Affairs Subcommittee on Oversight of Government Management and the District of Columbia held yet another hearing on weaknesses in the FAA's inspection system. Unfortunately, however, the Senate's renewed interest didn't come soon enough. Two weeks after the hearing, a Valujet DC-9 airliner crashed into the Florida Everglades, killing all 110 people aboard. Subsequently, it was revealed that during the discount airline's three-year existence, it had failed in numerous instances to meet FAA safety standards. The problems were serious enough that in February 1996 three FAA inspectors had recommended that the agency consider compelling Valujet to go through an immediate recertification. From February through May of that year, Valujet pilots were forced to make 59 emergency landings—an average of nearly one every other day. The FAA allowed Valujet to continue flying, although after the crash, when the agency conducted a month-long intensive review, it found enough problems to ground the airline. A Transportation Department investigation eventually determined that the FAA's lead inspector on Valujet's maintenance was unqualified for the position and had been promoted because of his friendship with FAA managers with whom he had served in the military reserves. Subsequent investigations by the Transportation Department found wider problems: The mechanics certified by the FAA to test other mechanics on proficiency were passing their students 99 percent of the time, yet when Transportation Department and FAA officials observed the testing, the pass rate dropped to 40 percent.
Other Holes in the Safety Net

With such revelations, Congress saw the need to do something: It commissioned yet another study of the problem by the GAO. That study, released in March 1998, concluded that although 96 percent of FAA inspections revealed no problems, the system was riddled with serious deficiencies. "Many inspectors do not report all problems or violations they observe," the GAO's study said. "In addition, many inspections are not thorough or structured enough to detect many violations. Finally, FAA's inspection tracking systems do not distinguish major from minor violations. FAA's information on compliance in the aviation industry is thus incomplete and of limited use in providing early warning of potential risks and in targeting inspection resources to the greatest risks."26

"I'm very concerned that once again the FAA has fallen short by not fully utilizing its capabilities to help determine potential aviation safety and security problems," Senator John McCain, a Republican from Arizona who chairs the Senate Commerce, Science, and Transportation Committee and who asked for the GAO investigation, recently told a reporter for Air Safety Week.27 It remains to be seen whether that concern will result in meaningful change or whether the latest report will merely add to the growing body of GAO literature on the subject in the Library of Congress.

Is It Real or . . . ?

For decades, the use of "bogus" parts—that is, parts lacking documentation that they meet FAA safety standards—has been a problem in the aviation industry. While some of these parts are safe but lacking proper paperwork, others may be counterfeit or even illegally salvaged from crashed jets. After an American Airlines jet crashed in Colombia in December 1995, for example, thieves rooted through the wreckage and made off with hundreds of parts, including sections of the jet engines, the landing gear, and electronic components. The parts were offered for sale in Miami, alarming executives of some airlines to the extent that they hurriedly sent a list of the stolen parts' serial numbers to other carriers. In 1992, Dennis Brett, an unregulated aircraft-parts broker in Dallas, acquired and sold jet-engine turbine disks salvaged from a plane crash in Brazil three years earlier. His bogus parts ended up in America West and Federal Express jets before he was caught and sentenced to five months in federal prison.29

In February 1991, an air-traffic controller at Los Angeles International Airport mistakenly guided a USAir jet and a SkyWest commuter plane onto the same runway. Thirty-four people died.
The FAA has maintained that bogus parts have never resulted in an air crash, a claim that has been refuted by the NTSB. In 1989, for example, bogus bolts, bushings, and brackets caused the tail to fall off a U.S.-built Norwegian Convair airliner, resulting in a crash that killed 55 people. An investigation by the Associated Press revealed that, according to the FAA's records, unapproved parts played a role in 174 aircraft crashes or less serious accidents from 1973 to 1996, including seventeen deaths. Although none of the crashes involved major airlines, the high number of bogus parts in circulation puts all airlines at risk. In fact, an internal Transportation Department investigation in December 1994 found that 43 percent of aircraft parts were bogus. The FAA hadn't even kept its own house in order: Thirty-nine percent of the spare parts for the agency's aircraft, it turned out, were bogus as well.

In October 1995, two officers of a New York City-based company pleaded guilty to five felony counts for supplying bogus parts for a fire-extinguisher system in Air Force One's President's plane. The following year, a team of FAA inspectors, who suspected three repair stations of using bogus parts, wanted to check engines in thousands of cargo and passenger jets to ensure that they were safe. The agency was about to publish a mandatory order in the Federal Register in January 1997 when word came down from FAA brass to kill the order. Instead, four months later, the FAA published a non-mandatory order, cryptically noting that certain unnamed stations may have used unauthorized parts.

Mike Fanfalone, the president of the union that represents FAA inspectors, told the National Civil Aviation Review Commission in October 1997 that the FAA's record-keeping conceals the magnitude of the problem; in the agency's database, he testified, "each numbered report is counted as one report, despite the fact that it may contain hundreds or thousands of parts." Fanfalone warned that "aviation safety will be seriously jeopardized by the FAA's continued failure to identify and to curtail the uses of bogus parts in our nation's aircraft."

But the FAA, Democratic Senator Carl Levin of Michigan pointed out at a hearing in 1995, "has not always been given a consistent message about how tough it should be in this area." In 1981, Levin recalled, the FAA proposed a regulation that, in part, would have enabled it to revoke the authorization of
anyone caught making false statements in connection with aircraft parts. But instead of winning praise from Congress for taking a tougher stance, some members of the House Small Business Committee attacked the FAA for proposing such a harsh penalty. The agency, thus chastened, waited ten years before it finally put such a rule on the books.\(^{36}\)

**Hits and Misses**

On a foggy morning in February 1998 at Ontario International Airport in California, United Airlines Flight 436 was cleared to take off for what should have been a routine flight to Denver. As the Boeing 737 taxied down the runway at 127 miles per hour, the pilot of the United plane was startled to see another 737—Southwest Airlines Flight 1710, bound for Sacramento—suddenly emerge from the fog on the runway, directly in his path. The United pilot slammed on his brakes and swerved, but not before his plane came within 1,000 feet of colliding with the other jet.\(^{37}\)

Fortunately, no one was hurt that day at Ontario. But other participants in runway "incursions"—FAA jargon for planes that are on the wrong runways at the wrong times—have not been so fortunate. In December 1990, eight people died when a Northwest Airlines jet landing in Detroit collided in fog with another Northwest plane that was taking off.\(^{38}\) In February 1991 at Los Angeles International Airport, an air-traffic controller mistakenly guided a USAir jet and a SkyWest commuter plane onto the same runway. Thirty-four people died,\(^{39}\) mostly from smoke inhalation when the entangled planes skidded into a building and caught fire. (NTSB investigators also found that the control tower's view of the crash was blocked and that a ground radar system was out of order.\(^{40}\)) In November 1994, two people were killed and eight injured when a light plane strayed into the path of a TWA jet on a runway in St. Louis.\(^{41}\)

The NTSB recommended to the FAA back in 1976 that it develop a ground-based radar system to help air-traffic controllers keep planes on the ground out of one another's—and thus harm's—way. The necessity of such precautions was dramatized the following year in the Canary Islands, when two 747 jumbo jets collided on the runway and 583 people lost their lives—the worst accident in civil aviation history. Nevertheless, the FAA waited until 1990 to award a contract on such a radar system, and the equipment is still being installed at airports. A companion computer system will not be fully operational until 2000.\(^{42}\) Meanwhile, James Hall, the chairman of the NTSB, told Congress in 1997 that more than 700 people had been killed in runway mishaps over the previous two decades.\(^{43}\)
Representatives of the FAA said at the hearing that the agency had made progress on measures to prevent incursions, such as improving lighting on taxiways. But the FAA has resisted a 1991 recommendation that it require aircraft to install brighter anticollision lights to warn other planes of their positions.

Meanwhile, the problem has escalated. Kenneth Mead, the Transportation Department’s inspector general, testified that the FAA had developed a plan in 1995 to coordinate efforts across the nation to reduce the number of mishaps but had been slow to proceed with the project. During the past four years, the number of near collisions between planes on the ground has jumped by more than 50 percent, and with the projected growth in air traffic, the problem is expected to get worse.

Congress’s response? The House Government Operations Subcommittee on Government Activities and Transportation held hearings in 1991, after the Los Angeles International Airport accident, and the House Transportation and Infrastructure Subcommittee on Aviation held hearings again in November 1997. But otherwise, Capitol Hill lawmakers have done nothing to prod the FAA into action.

Representative Peter DeFazio, a Democrat from Oregon, told FAA officials in frustration, "You might do something on this before I die or before I get out of Congress, but I doubt it."
"Slats," said James Philip Hayes, the first officer of USAir Flight 1016. Hayes was at the controls of the DC-9 as the plane made its final approach to Charlotte/Douglas International Airport, at an altitude of 2,300 feet, just over six minutes from the fatal crash that would kill 37 passengers.1

"Slats down," replied Captain Michael Greenlee, a nine-year veteran of USAir who had flown 1,970 hours in a DC-9.2 The flight crew was going through the pre-landing checklist, crossing the t's and dotting the i's. The "sterile cockpit" rule at altitudes under 10,000 feet meant that the pilots were not allowed to talk about anything but the business at hand—safely taking off or safely landing.3

"This thing just drops like a rock, doesn't it?" Greenlee said a few seconds later.

"Boy, doesn't it?" Hayes replied. "Better than that Boeing can do."

"The seven twos come down pretty good," Greenlee said.

"Aw, the seven two will, yeah."

Seconds later the Charlotte approach tower radioed Flight 1016. "I'll tell you what, USAir 1016 may get some rain just south of the field. Might be a little bit coming off north."4

On that July evening, the reassuring statistics on the safety of air travel had little bearing on what was to happen. Although the NTSB would later intensely study each moment that led to the crash, the groundwork for the accident had been laid years earlier, when the major airlines began monopolizing key airports around the country, when mergers and acquisitions put pilots who had never flown together in the same cockpits, and when airlines themselves grew
so large that there was no way the FAA could effectively regulate them. As the industry dramatically changed, Congress did nothing to change the agencies that regulated it. Instead, lawmakers turned a blind eye, consistently ignoring warnings of the dangers of their laissez-faire policies.

As Greenlee and Hayes discussed the relative merits of Boeing and McDonnell Douglas aircraft, observers on the ground noticed a thunderhead looming like "Mount Everest" right over the airport. On the ground, controllers cleared Flight 1016 to land on runway 18R. Unfortunately, due to a communication breakdown, the controllers didn't fully inform Flight 1016 of the latest information about the weather's severity. Their job was made more difficult by the fact that the airport lacked an up-to-date Doppler weather radar system, which would have given several minutes' additional warning of the dangerous conditions; Charlotte had been scheduled to receive such equipment in 1993, but the FAA had fallen behind schedule in the program. In any case, the FAA would later admit that it was partially to blame for the accident.

At the same time, in the cockpit of Flight 1016 a software flaw prevented the aircraft's wind-shear detection system from warning the flight crew that they were about to enter a microburst—a sudden, violent column of rapidly falling air that fans out as it hits the ground. Microbursts pose the greatest threat to aircraft as they land or take off, when air speed is low and the rush of air can rob a plane's wings of lift.

Five minutes before impact, Captain Greenlee told his copilot, "I'm glad we got that sandwich down there, because I hate eating late. I'd rather eat something nasty early than . . ."

"Something good late," Hayes finished.

"Something good late, within reason," the captain added.

At just over three minutes to impact, Greenlee told Hayes, "If we have to bail out, it looks like we bail out to the right."

"Amen," Hayes responded.

"So I think we'll be all right," Greenlee said.

Four seconds later, he added, "Chance of shear."

At just under two minutes to impact, the crew of Flight 1016 asked for and received a report from the pilot of USAir Flight 983, who had just landed.
The tower reported to Greenlee and Hayes that the Fokker 100 had had a "smooth ride."\textsuperscript{11}

At more than a minute and a half to impact, the control tower noted a wind-shear alert at the northeast boundary of the tower. Two USAir planes awaiting takeoff decided to wait out the storm. One pilot, asked by the tower if he wanted to take off, said, "No, no—it wouldn't sound like a good plan. It didn't look like a whole lot to us on the radar taxiing out, so it shouldn't be too many minutes."\textsuperscript{12}

Eleven seconds later, Greenlee and Hayes were caught in a wall of water. They tried to bail out to the right, but the captain—apparently caught by surprise and hampered by poor visibility—mistakenly told the first officer to point the plane's nose down.\textsuperscript{13} Just outside the cockpit, flight attendant Richard DeMary, who was seated for landing, was startled by a robotic voice shouting: "Terrain! Terrain! Terrain!" It was the alarm of the aircraft's ground-proximity warning system.\textsuperscript{14}

The NTSB concluded that the probable causes of the accident were the flight crew's decision to land in severe weather that had the potential for wind shear; the crew's failure to recognize the wind shear in a timely manner; the crew's failure to perform the necessary maneuvers to escape wind shear; and, finally, the lack of timely weather and wind-shear hazard information from air-traffic-control operators.\textsuperscript{15} If the first of those four things hadn't happened, if pilots Greenlee and Hayes had decided to ride out the storm and circle the airport for fifteen or twenty minutes—by which time the skies were blue and clear, according to witnesses—Flight 1016 would have been utterly unremarkable.\textsuperscript{16}

"This is a situation of trying to cope with a thunderstorm rather than avoid it," James Burnett, the chairman of the NTSB from 1981 to 1991, testified in a 1997 civil suit brought by survivors and family members of the crash victims. Burnett noted that Charlotte/Douglas International Airport was a hub of USAir and that the hub-and-spoke system used by most airlines "is very sensitive to maintaining timely operations. If there are delays in planes coming in, it means delays in planes going out, so even short delays ... can be quite critical to airline operations."\textsuperscript{17}

The hub-and-spoke system is a creature of airline deregulation. Rather than offer direct service between city pairs, all but one of the major airlines offer one-stop service through a connecting hub. If there are twenty cities the airline serves to the east and twenty cities to the west, from the connecting hub the airline can serve 440 city pairs with just twenty aircraft.\textsuperscript{18}
But hubs, by and large, are dominated by single carriers. As early as 1989, some Members of Congress stated that deregulation, which was supposed to spark competition and lower fares for consumers, had actually had the opposite effect. "Deregulation initially worked as it was intended to work," John Danforth, then a Republican Senator from Missouri, told Time magazine in May of that year. "As of this point in time, deregulation has failed."\(^{19}\)

Representative James Oberstar, a Democrat from Minnesota, told Aviation Week in February 1989: "You had this explosion of competition in the early years of deregulation. All of a sudden, that supernova began to contract and became a dense mass of a few hub cities and a few major airlines as it sucked in other competitors and swallowed them."\(^{20}\)

As bad as the situation was in 1989, it has gotten worse since. A 1998 study by Salomon Smith Barney found 33 of the nation's fifty largest airports—which in 1996 accounted for 81 percent of the nation's air travelers—to be highly concentrated. In 1989, Delta controlled 70.4 percent of the traffic out of Atlanta Hartsfield international Airport; by 1997, it had increased its market share to 80.2 percent. In 1989, Northwest controlled 67.3 percent of the traffic out of Detroit Metropolitan Airport; by 1997, it had increased its market share to 80.4 percent. In 1989, American Airlines controlled 13.1 percent of the traffic out of Miami International Airport; by 1997, it had increased its market share to 66.6 percent.\(^{21}\)

A wave of mergers and bankruptcies in the mid-1980s left a greater and greater percentage of the airline business in fewer and fewer hands. Venerable carriers like Pan-American World Airways and Eastern Airlines went bankrupt, along with such upstarts as People's Express and Muse Air. In 1986, Trans World Airlines merged with Ozark Airlines, giving TWA a monopoly out of St. Louis. That same year, Northwest merged with Republic Airlines, giving it effective control of the traffic out of Detroit and Minneapolis.\(^{22}\) In 1989, USAir merged with Piedmont Airlines, giving it control of 34 of Charlotte's 46 gates.\(^{23}\)

In 1996, the General Accounting Office found that Charlotte had, on average, the highest fares in the nation—88 percent higher than elsewhere in the country.\(^{24}\) In 1989, USAir controlled 38.1 percent of the traffic out of Charlotte; after its merger with Piedmont, it controlled 93.6 percent. After monopolizing Charlotte, USAir began charging monopoly fares.\(^{25}\)

In October 1989, Danforth introduced legislation that would have ended airline monopolies like that enjoyed by USAir at Charlotte and TWA at Lambert International, in Danforth's home state of Missouri. The bill would have allowed the Transportation Department to reassign gates at hub airports to competitors, among other measures designed to foster competition.\(^{26}\) In May
1991, Oberstar introduced legislation that would require airports to provide gates for new entrants. And in 1997, Republican Senator John McCain of Arizona introduced legislation to prevent predatory behavior by major airlines. To date, none of this legislation has passed.

In 1988, 1990, 1994, 1996, and 1997, the GAO reported to Congress on the effects of single airlines monopolizing selected airports around the country, and concluded that the practice prevented effective competition. The agency found that fares at airports dominated by single carriers were higher than those at other airports.

The Transportation Department reported in a 1996 study that consumers paid, on average, $140 more for a round-trip ticket from a major airline's hub. Released eighteen days before ValuJet Flight 592 crashed into the Florida Everglades, the report extolled the benefits of low-fare airlines, noting that they saved consumers $6.3 billion in airfares in 1995.

"Almost all the savings in fares have been caused by the low-fare airlines," Patrick Murphy, the deputy assistant Transportation Secretary for aviation, told the Center. "The major carriers tend to compete only from their hubs. They're not going to compete for the traffic out of another airline's hub. Each will stay in their own area where they operate."

Areas like Mobile, Alabama.

ValuJet announced on January 7, 1997, that it was suspending service on its Atlanta-Mobile route because it couldn't make a profit. That move left its only competitor, Delta Airlines, with a monopoly on the route. Delta, which had matched ValuJet's round-trip $59 fare, raised its tariff to $404 the following day.

Mobile's airport authority sprang into action, and in less than a week it put together an offer of financial incentives to induce ValuJet to return to Mobile, which the airline did four days later, on January 11. Delta's fare dropped again to $59.

This is the same ValuJet that pretty much on its own, according to an April 1996 study by the FAA—boosted the serious-accident rate for low-fare airlines to six times that of the major carriers. That study, of course, didn't include the Everglades crash, which occurred in May of that year.

"We made modest payments [to ValuJet], and it was the airport authority that did that," Marc Pelham, the marketing director for the Mobile airport, told Congress did nothing to alter the economics of the airline business. It did not break the monopolies of the large carriers in their markets, nor did it try to prevent the mergers in the 1980s that led to today's mega-carriers.
the Center. "But to put that in context, on an annual basis travelers to Mobile are saving $35 million. Some of the carriers don't seem to be concerned about the communities they serve. Many of them will tell you they'd rather have a few high-fare business travelers than a lot of leisure travelers. The people this touches are the people with limited resources, who couldn't afford otherwise to travel. Where is the customer in all this? Nowhere."

While the GAO noted that airport regulation is largely a matter of local control, there is a precedent, perhaps even a mandate, for legislative intervention. In 1990, the GAO stated: "Airport facilities are essentially local responsibilities, yet most operate under federal restrictions imposed by the Airport and Airway Improvement Act of 1982. This act requires that airports receiving federal grants be public-use facilities, available for all to use on an equal basis."

Yet Congress did nothing to alter the economics of the airline business. It did not break the monopolies of the large carriers in their markets, nor did it try to prevent the mergers in the 1980s that led to today's mega-carriers. If it had, Michael Greenlee and James Philips Hayes, the pilot and copilot of USAir Flight 1016, would never have been sitting in the same cockpit on July 2, 1994. Greenlee had worked for USAir since 1985; Hayes was a former Piedmont pilot, who, thanks to the merger, had become a USAir pilot in 1989.

"USAir is an airline that's a product of various different mergers and various different pilot cultures," David E. Rapoport, who represented plaintiffs in the crash of Flight 1016, told the Center. "Those that came from Allegheny [USAir's predecessor] had very different practices than those from Piedmont. The last big merger was in 1989: a small airline became huge, and they had huge problems with cockpit discipline. Pilot-culture issues were never settled. Pilots were allowed to be cowboys."

Five years after the Piedmont-USAir merger, in the aftermath of the crash of Flight 1016, the FAA's principal operations inspector assigned to USAir, David Bowden, told the NTSB that there were indeed "different cultures" within USAir. The NTSB Operations Group Chairman's Factual Report states, "[Bowden] said that there are variants in DC-9 crew standardization. He said that this was not acceptable to him, but he recognized it would take years to change the culture."

In its accident report, the NTSB found that Thomas Johnson, USAir's direc-
tor of flight training and standards, who was responsible for assuring that pilots performed their duties in the safest possible manner, set an unusual standard for safety. The percentage of pilots who failed their training was always 2 percent. "Two percent is a healthy failure rate," Johnson told the NTSB. "Anything less than 2 percent would be [an indication] that we're not challenging enough. Anything more than 2 percent means that we have a faulty program in place."

So the airline's standard for safety was an arbitrary one.

In pretrial discovery, Rapoport uncovered a November 11, 1991, letter from O.L. Smith, Boeing's assistant chief for pilot training, to USAir criticizing the company's training procedures. "On a couple of proficiency checks, pilot performance was observed to be substandard, but no corrective action was taken. Instructors remarked that it was impossible to fail a check because of the scheduling problems that would be created." (Emphasis added.)

The FAA, which is supposed to safeguard the flying public, was little better than USAir's own instructors. Bowden, who as principal operations inspector had oversight responsibility over USAir, said he believed his responsibility was to "help" the airline comply with the regulations and to promote aviation safety. He helped USAir when, in 1993, he learned that 51 USAir pilot training records indicated a lack of wind-shear training. Rather than determine independently whether the pilots needed wind-shear training, he relied on USAir to rectify the situation. He told the NTSB that he had only eleven inspectors to oversee a training program that involved 15,000 USAir employees. "I cannot follow up on every noncompliance that we find out there," he told the board. "I have to rely on the carrier to take that responsibility."

So, unfortunately, must the average air traveler.
In 1997, at the confirmation hearing of Jane Garvey, President Clinton's nominee to be administrator of the Federal Aviation Administration, members of the Senate Commerce Committee quizzed Garvey on whether she felt up to the task of improving air safety on the tight budget that Congress had given the agency. With just a 3 percent increase in funding over five years, the agency not only would have to complete most of a massive, multibillion-dollar overhaul of the air-traffic-control system, but also would have to cope with a 12 percent growth in traffic. "We present the challenge of how to do more with less," Senator Wendell Ford, a Democrat from Kentucky, said, "how to be safer with less money."  

The FAA was in a peculiar fiscal predicament, and Congress had helped put it there. More than 70 percent of the agency's budget is funded by direct taxes on such things as airline tickets, air cargo, and jet fuel. Those revenues are paid into the Airport and Airway Trust Fund, also known as the Aviation Trust Fund. The fund was established back in 1970 for the purpose of financing the construction and upkeep of airports and other capital projects, but as air traffic grew in the years that followed, the fund was increasingly tapped to underwrite a portion of the FAA's operations as well. The airline industry's boom during the mid-1990s, combined with Congress's raising of aviation taxes, meant that the fund was flush with revenue. But Congress, not the FAA, had control of how the money was spent, and in the 1990s Congress had allowed billions of unspent dollars to accumulate in the fund as a way of helping to mask the true size of the federal budget deficit. (In 1995, a House bill had proposed to take the Aviation Trust Fund "off-budget," and Ford and Senator John
McCain, a Republican from Arizona, had introduced legislation that would have given the FAA authority to raise funds on its own by setting user fees for inspections and other services, but the bills had failed. It was cheap for Congress to hold hearings about problems, but expensive to actually fix them.

After taking office as the FAA's new administrator, Garvey began to lay out how the agency would reverse what she described as the public's "striking loss of confidence" in the government's safety regulation of air travel. In October 1997, in a speech at the Aero Club of Washington, she gave a glimpse of the plan that the FAA was developing to achieve that goal on a shoestring. The agency, she said, would adopt "a focused safety agenda." It couldn't possibly act on all of the more than 450 safety recommendations made by the NTSB, the GAO, and others over the years; instead, it would focus on a handful of causes of accidents. "We already know the key areas of emphasis, and they won't surprise you—controlled flight into terrain accidents, human-factors issues, and landing and approach accidents." In addition to that stripped-down agenda, Garvey said, the FAA planned "to improve upon the relationship between the regulator and the regulated."

"Times have changed," she said. "Both aviation and the industry have matured. Technology has advanced and will continue to advance at a dramatic rate. The issues have become much more complex. At the same time, we have a structure in place, developed in an era of intense government regulation. We need a new safety model—one where government can be both a partner and, when necessary, an enforcer. Yes, we need compliance, but to make further breakthroughs in safety, to lower the accident rate, we must collaborate on the safety agenda and the means to fulfill it."

That vision of a more industry-friendly FAA was strikingly similar to one laid out soon afterward by the National Civil Aviation Review Commission, which Congress created in late 1996 to come up with a plan for revamping the FAA. The commission's 21 members—13 of them selected by the Transportation Secretary and the rest by congressional leaders in both parties—included executives of Boeing and of various airlines, and almost all had some professional connection to the aviation industry. The chairman was Norman Mineta, a former Democratic Representative from California who had chaired the
committee (then Public Works and Transportation, now Transportation and Infrastructure), with primary responsibility for overseeing the FAA and the aviation industry. Mineta had left Capitol Hill to join Lockheed Martin as a senior vice president.

"Safety improvements are not likely to be broadly effective if traditional regulatory enforcement is the primary approach taken by the federal government," a statement issued by the commission declared. Instead, the commission wanted the FAA to take a gentler, more co-operative role with the industry. It envisioned the FAA and the airlines jointly drawing up a list of safety improvements that both agreed would have the most benefit, and then formulating a "strategic safety plan" that focused on those points. The FAA would largely focus on achieving those goals and would spend less time trying to remedy problems that had caused crashes. "If the FAA were to have strategic prioritization of safety initiatives supported by quantifiable data," the commission's statement read, "there would always be a sense of where the latest event"—that is, the latest air disaster—"fell on the yardstick of overall priorities."9

The commission would have the airlines turn over more detailed safety information, such as the routine data from flight recorders, to the FAA but would have the government keep the information secret so that it would not be "misunderstood by the press or public."10 (The secrecy was specifically requested by the Air Transport Association, the airline industry's chief trade group in Washington.11)

Members of the commission also wanted to see the NTSB ease its pressure on the FAA to make safety improvements, which they felt should make up "only one segment of the FAA's priorities." Additionally, the commission suggested that the NTSB's crash investigations could be "improved and given even greater credibility" by giving the airlines themselves a major role in determining the cause of accidents.12

Although the commission portrayed the FAA as an agency on the brink of collapse and quoted grave projections of increased accident rates in the near future, it placed little blame on the industry. Instead, it cited data depicting airline crashes as caused mostly by crew error, and it minimized safety lapses by airlines and manufacturers. The commission, for example, concluded that the use of parts that had not been approved by the FAA was not a significant problem, saying the number of these "bogus" parts in aircraft was minuscule compared with the number of properly documented, FAA-approved parts in use. While acknowledging that a criminal black market in low-cost, substan-
standard parts existed, the commission insisted that airlines' and manufacturers' current safeguards kept most of these parts out of airplanes.\textsuperscript{13} That finding flew in the face of multiple investigations by Congress, the Transportation Department, and the FBI, as well as testimony to the commission by Mike Fanfalone, the head of the inspectors' union.

But no matter. As 1998 began, the chorus of supporters for a tamer and weaker FAA grew even more insistent. At a February press conference, aircraft manufacturers, the pilots' union, and the airlines announced that they were joining forces in a new organization, the Commercial Aviation Safety Strategy Team. The organization's avowed goal was to lobby for regulatory focus on a short list of ongoing safety issues, such as better training for pilots, and to shift the regulators' focus away from remediating the causes of crashes. The organization cited as an example the 1996 Valujet crash, which focused attention on smoke-and fire-safety systems in cargo holds; although the accident killed 110 people, it was the decade's only fatal crash caused by a cargo fire, so it was a mistake, the leaders of the new organization said, to devote too much attention to such problems. Just in case anyone got the wrong idea, however, the group handed out statistics showing that air travel remained very safe.\textsuperscript{14}

By its own admission, of course, the industry wants to shift the focus away from catastrophic accidents and safety flaws in planes for another reason: Why put a damper on the industry's booming fortunes? Last year, the U.S. airlines posted operating profits of $7.9 billion, up from $4.3 billion in 1996.\textsuperscript{15} And according to industry surveys, the ticket-buying public is spooked every time there's a crash. Air Safety Week reported that after a series of fatal accidents in the summer of 1997, including the Korean Air Flight 801 crash in Guam, public-opinion surveys showed that the number of respondents who answered yes to the question "Do you feel that air travel has gotten safer?" dropped by 15 percent. (Even before that, less than half of the respondents thought that air safety was improving.) The most cited concerns were aging aircraft, maintenance, and increasingly crowded air traffic.\textsuperscript{16}

With the Clinton Administration, the airline industry, and the FAA itself supporting such an approach, it seems unlikely that Congress will dissent. In April of this year, at a press conference at Ronald Reagan Washington National Airport,
Vice President Albert Gore, Jr., and Transportation Secretary Rodney Slater joined Garvey in unveiling the FAA's new "Safer Skies" agenda, in which the agency would focus on working with industry on a short list of priorities. The list closely resembles the lists compiled by the National Civil Aviation Review Commission and by a 1997 White House commission chaired by Gore: Other than a proposal to inspect engine parts more carefully, few of the measures put much pressure on the industry. At the top of the list, for example, is a proposal to require that airliners be equipped with terrain-avoidance warning systems, which members of the Air Transport Association already agreed to in December 1997. Another goal is a reduction in runway mishaps, a problem the FAA has failed to solve in previous initiatives. This time, the agency—apparently, in contrast to its past efforts—says it is "working with the aviation community to identify various educational programs and technological advances through which the current rate of incursions can be reduced."

"Tragic and dramatic as the crash of TWA 800 was, exploding fuel tanks are very, very rare," Stuart Matthews, the president of the industry-supported Flight Safety Foundation, said shortly before the April press conference. "We need to go after the major problems, not the safety issue du jour."

But the history of the FAA shows that it often takes years—sometimes decades—for the agency to respond to problems. In February 1998, for example, the FAA quietly put out an announcement that, apparently thanks to a White House commission's support for child-restraint devices, it at last was reconsidering its resistance to requiring safety seats for children on aircraft. The agency issued a notice of proposed rule-making, inviting comment from interested parties, and even revealed that it had tested a prototype device with some success. The announcement came nearly twenty years after the death of two infants on an airliner in Oregon, the accident that had initially prompted the NTSB to recommend that the FAA prohibit parents from holding children on their laps. If the FAA had acted then, Tywonda Brown's daughter, Danasia, might be starting kindergarten in the fall.
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Top Contributors to Congressional Campaigns 1987-96

TRADE ASSOCIATIONS AND POLITICAL ACTION COMMITTEES

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### Top Contributors to Congressional Campaigns 1987-96

**MANUFACTURING INTERESTS**

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### Top Contributors to Congressional Campaigns 1987-96

#### CARGO AND FREIGHT INTERESTS

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#### AVIATION PRODUCTS AND SERVICES

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# Top Senate Recipients of Campaign Contributions 1987-96

## AVIATION INTERESTS

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<td>Lloyd Bentsen</td>
<td>D-Texas</td>
<td></td>
<td>88,000</td>
</tr>
<tr>
<td>Harris Wofford</td>
<td>D-Pa.</td>
<td></td>
<td>85,750</td>
</tr>
</tbody>
</table>

Names in boldface are current Members of the Senate.

- Appropriations = Appropriations Committee
- CS&T = Commerce, Science, and Transportation Committee
- CS&T/A = Commerce, Science, and Transportation Subcommittee on Aviation
- Governmental Affairs = Governmental Affairs Committee
### Top House Recipients of Campaign Contributions 1987-96

**AVIATION INTERESTS**

<table>
<thead>
<tr>
<th>Representative</th>
<th>Party-State</th>
<th>Committee</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>James Oberstar</td>
<td>D-Minn.</td>
<td>T&amp;I/Aviation</td>
<td>$303,505</td>
</tr>
<tr>
<td>John Murtha</td>
<td>D-Pa.</td>
<td>Appropriations</td>
<td>289,225</td>
</tr>
<tr>
<td>Newt Gingrich</td>
<td>R-Ga.</td>
<td>T&amp;I/Aviation</td>
<td>275,165</td>
</tr>
<tr>
<td>Norman Mineta</td>
<td>D-Calif.</td>
<td>T&amp;I</td>
<td>244,292</td>
</tr>
<tr>
<td>Charles Wilson</td>
<td>D-Texas</td>
<td>Appropriations</td>
<td>228,568</td>
</tr>
<tr>
<td>Richard Gephardt</td>
<td>D-Mo.</td>
<td></td>
<td>218,750</td>
</tr>
<tr>
<td>G.W. (Bill) Hefner</td>
<td>D-N.C.</td>
<td>Appropriations</td>
<td>200,710</td>
</tr>
<tr>
<td>Norman Dicks</td>
<td>D-Wash.</td>
<td>Appropriations</td>
<td>197,715</td>
</tr>
<tr>
<td>Martin Frost</td>
<td>D-Texas</td>
<td></td>
<td>170,000</td>
</tr>
<tr>
<td>Pete Geren</td>
<td>D-Texas</td>
<td>T&amp;I/Aviation</td>
<td>166,155</td>
</tr>
<tr>
<td>Bud Shuster</td>
<td>R-Pa.</td>
<td>T&amp;I/Aviation</td>
<td>144,207</td>
</tr>
<tr>
<td><strong>Greg Laughlin</strong></td>
<td>D-Texas</td>
<td>T&amp;I/Aviation</td>
<td>135,141</td>
</tr>
<tr>
<td>Les Aspin</td>
<td>D-Wis.</td>
<td></td>
<td>130,085</td>
</tr>
<tr>
<td>William Clinger</td>
<td>R-Pa.</td>
<td></td>
<td>126,575</td>
</tr>
<tr>
<td>Jane Harman</td>
<td>D-Calif.</td>
<td></td>
<td>124,392</td>
</tr>
<tr>
<td>Robert Roe</td>
<td>D-N.J.</td>
<td>T&amp;I</td>
<td>122,650</td>
</tr>
<tr>
<td>William Lipinski</td>
<td>D-I11.</td>
<td>T&amp;I/Aviation</td>
<td>117,840</td>
</tr>
<tr>
<td>Tom DeLay</td>
<td>R-Texas</td>
<td>Appropriations/T&amp;RA, T&amp;I</td>
<td>114,385</td>
</tr>
<tr>
<td>Joseph McDade</td>
<td>R-Pa.</td>
<td>Appropriations</td>
<td>112,750</td>
</tr>
<tr>
<td>Martin Olav Sabo</td>
<td>D-Minn.</td>
<td>Appropriations/T&amp;RA</td>
<td>107,600</td>
</tr>
<tr>
<td>Ronald Coleman</td>
<td>D-Texas</td>
<td>Appropriations/T&amp;RA</td>
<td>98,950</td>
</tr>
<tr>
<td>Robert Livingston</td>
<td>R-La.</td>
<td>Appropriations</td>
<td>86,550</td>
</tr>
<tr>
<td>Glenn Anderson</td>
<td>D-Calif.</td>
<td>T&amp;I/Aviation</td>
<td>86,100</td>
</tr>
</tbody>
</table>

Names in boldface are current Members of the House of Representatives.

*Appropriations = Appropriations Committee*

*Appropriations/T&RA = Appropriations Subcommittee on Transportation and Related Agencies*

*T&I = Transportation and Infrastructure Committee*

*T&I/Aviation = Transportation and Infrastructure Subcommittee on Aviation*
### Passenger-Seat Strength

#### 1996

**BY TYPE OF AIRCRAFT**

<table>
<thead>
<tr>
<th>Aircraft</th>
<th>Number of Planes Surveyed</th>
<th>Seats Per Plane</th>
<th>Total Number of 9-g Seats</th>
<th>Total Number of 16-g Seats</th>
<th>Percentage of 9-g Seats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boeing 727</td>
<td>407</td>
<td>150</td>
<td>52,052</td>
<td>8,873</td>
<td>85%</td>
</tr>
<tr>
<td>McDonnell Douglas DC-9</td>
<td>329</td>
<td>103</td>
<td>28,109</td>
<td>5,742</td>
<td>83%</td>
</tr>
<tr>
<td>Boeing 737</td>
<td>920</td>
<td>123</td>
<td>65,121</td>
<td>48,293</td>
<td>57%</td>
</tr>
<tr>
<td>McDonnell Douglas MD-80</td>
<td>544</td>
<td>141</td>
<td>42,076</td>
<td>34,368</td>
<td>55%</td>
</tr>
<tr>
<td>Boeing 747</td>
<td>88</td>
<td>384</td>
<td>11,865</td>
<td>21,950</td>
<td>35%</td>
</tr>
<tr>
<td>Boeing 757</td>
<td>365</td>
<td>187</td>
<td>19,150</td>
<td>49,223</td>
<td>28%</td>
</tr>
<tr>
<td>Boeing 767</td>
<td>200</td>
<td>206</td>
<td>11,993</td>
<td>29,151</td>
<td>28%</td>
</tr>
<tr>
<td>McDonnell Douglas DC-10</td>
<td>70</td>
<td>286</td>
<td>24,638</td>
<td>8,568</td>
<td>26%</td>
</tr>
<tr>
<td>Airbus A320</td>
<td>112</td>
<td>143</td>
<td>0</td>
<td>15,986</td>
<td>0%</td>
</tr>
<tr>
<td>Airbus A300</td>
<td>35</td>
<td>266</td>
<td>0</td>
<td>9,310</td>
<td>0%</td>
</tr>
<tr>
<td>McDonnell Douglas MD-11</td>
<td>19</td>
<td>246</td>
<td>0</td>
<td>4,675</td>
<td>0%</td>
</tr>
</tbody>
</table>

Source: Air Transport Association of America
# Accidents and Incidents of the Airlines 1987-97

<table>
<thead>
<tr>
<th>Airline</th>
<th>Incidents</th>
<th>Nonfatal Accidents</th>
<th>Fatal Accidents</th>
<th>Total Fatalities</th>
<th>Total Accidents and Incidents</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Airlines*</td>
<td>79</td>
<td>46</td>
<td>4</td>
<td>230</td>
<td>129</td>
</tr>
<tr>
<td>United Airlines*</td>
<td>50</td>
<td>42</td>
<td>4</td>
<td>136</td>
<td>96</td>
</tr>
<tr>
<td>Delta Airlines</td>
<td>44</td>
<td>31</td>
<td>3</td>
<td>17</td>
<td>78</td>
</tr>
<tr>
<td>Continental Airlines*</td>
<td>43</td>
<td>19</td>
<td>3</td>
<td>30</td>
<td>65</td>
</tr>
<tr>
<td>US Airways*</td>
<td>27</td>
<td>21</td>
<td>6</td>
<td>233</td>
<td>54</td>
</tr>
<tr>
<td>Northwest Airlines*</td>
<td>34</td>
<td>10</td>
<td>3</td>
<td>164</td>
<td>47</td>
</tr>
<tr>
<td>Trans World Airlines*</td>
<td>21</td>
<td>8</td>
<td>3</td>
<td>233</td>
<td>32</td>
</tr>
<tr>
<td>Eastern Airlines**</td>
<td>18</td>
<td>6</td>
<td>3</td>
<td>3</td>
<td>27</td>
</tr>
<tr>
<td>Pan American World Airways**</td>
<td>13</td>
<td>5</td>
<td>1</td>
<td>270</td>
<td>20</td>
</tr>
<tr>
<td>Southwest Airlines</td>
<td>10</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>19</td>
</tr>
<tr>
<td>America West</td>
<td>5</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>Alaska Airlines</td>
<td>8</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>Simmons Airlines</td>
<td>9</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>ValuJet</td>
<td>3</td>
<td>5</td>
<td>1</td>
<td>110</td>
<td>9</td>
</tr>
</tbody>
</table>

Source: National Transportation Safety Board

* Includes affiliates flying under the airline's colors.

** Airline went out of business.
## Accidents and Incidents with One Probable Cause
### 1987-97

<table>
<thead>
<tr>
<th>Probable Cause</th>
<th>Incidents</th>
<th>Nonfatal Accidents</th>
<th>Fatal Accidents</th>
<th>Total Fatalities</th>
<th>Total Accidents and Incidents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment failure</td>
<td>103</td>
<td>23</td>
<td>4</td>
<td>37</td>
<td>140</td>
</tr>
<tr>
<td>Seatbelt not fastened</td>
<td>0</td>
<td>12</td>
<td>0</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>Environment</td>
<td>8</td>
<td>41</td>
<td>0</td>
<td>0</td>
<td>49</td>
</tr>
<tr>
<td>Pilot error</td>
<td>52</td>
<td>50</td>
<td>8</td>
<td>203</td>
<td>110</td>
</tr>
<tr>
<td>Air-traffic control</td>
<td>27</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>27</td>
</tr>
<tr>
<td>Ground-crew error</td>
<td>11</td>
<td>21</td>
<td>4</td>
<td>4</td>
<td>36</td>
</tr>
<tr>
<td>Other aircraft</td>
<td>6</td>
<td>6</td>
<td>1</td>
<td>2</td>
<td>13</td>
</tr>
<tr>
<td>Airline operations</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>111</td>
<td>7</td>
</tr>
<tr>
<td>Maintenance</td>
<td>29</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td>35</td>
</tr>
<tr>
<td>Other*</td>
<td>29</td>
<td>18</td>
<td>5</td>
<td>316</td>
<td>52</td>
</tr>
<tr>
<td>Not yet determined**</td>
<td>71</td>
<td>37</td>
<td>8</td>
<td>534</td>
<td>116</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>339</strong></td>
<td><strong>215</strong></td>
<td><strong>32</strong></td>
<td><strong>1,208</strong></td>
<td><strong>596</strong></td>
</tr>
</tbody>
</table>

* Includes such causes as FAA oversight and procedures (cited as a probable cause in ten incidents and accidents, six of which resulted in a total of 242 fatalities); terrorism; bird strikes; airport conditions; improper actions by flight attendants; pilot illness and death; and passenger conduct.

** Investigation still open as of March 25, 1998.
# Accidents and Incidents with Multiple Causes 1987-1997

<table>
<thead>
<tr>
<th>Factor</th>
<th>Nonfatal Accidents</th>
<th>Fatal Accidents</th>
<th>Total Fatalities</th>
<th>Total Accidents and Incidents</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Equipment failure</strong></td>
<td>50</td>
<td>14</td>
<td>1</td>
<td>14</td>
</tr>
<tr>
<td><strong>Seatbelt not fastened</strong></td>
<td>2</td>
<td>5</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Environment</strong></td>
<td>14</td>
<td>11</td>
<td>2</td>
<td>28</td>
</tr>
<tr>
<td><strong>Pilot error</strong></td>
<td>26</td>
<td>17</td>
<td>5</td>
<td>81</td>
</tr>
<tr>
<td><strong>Air-traffic control</strong></td>
<td>22</td>
<td>2</td>
<td>3</td>
<td>72</td>
</tr>
<tr>
<td><strong>Ground-crew error</strong></td>
<td>7</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Other aircraft</strong></td>
<td>18</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Airline operations</strong></td>
<td>7</td>
<td>3</td>
<td>3</td>
<td>139</td>
</tr>
<tr>
<td><strong>Maintenance</strong></td>
<td>36</td>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td>17</td>
<td>9</td>
<td>5</td>
<td>182</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>111</td>
<td>46</td>
<td>43</td>
<td>323</td>
</tr>
</tbody>
</table>

*Includes such causes as FAA oversight and procedures (cited as a probable cause in ten incidents and accidents, six of which resulted in a total of 242 fatalities); terrorism; bird strikes; airport conditions; improper actions by flight attendants; pilot illness and death; and passenger conduct.*
## Members of Congress Killed in Plane Crashes

<table>
<thead>
<tr>
<th>Name</th>
<th>Date of Crash</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rep. Thaddeus Sweet (R-N.Y.)</td>
<td>May 1, 1928</td>
<td>At Whitney Point, Broome County, N.Y.</td>
</tr>
<tr>
<td>Sen. Bronson Cutting (R-N.M.)</td>
<td>May 6, 1935</td>
<td>Near Atlanta, Mo.</td>
</tr>
<tr>
<td>Rep. William Byron (D-Md.)</td>
<td>February 27, 1941</td>
<td>In Jonesboro, Ga., near Atlanta</td>
</tr>
<tr>
<td>Rep. Robert Coffey (D-Pa.)</td>
<td>April 20, 1949</td>
<td>In Albuquerque, N.M.</td>
</tr>
<tr>
<td>Rep. Hale Boggs (D-La.)</td>
<td>October 16, 1972</td>
<td>Disappeared on flight over Alaska</td>
</tr>
<tr>
<td>Rep. Nick Begich (D-Alaska)</td>
<td>October 16, 1972</td>
<td>Disappeared on flight over Alaska</td>
</tr>
<tr>
<td>Rep. George Collins (D-Ill.)</td>
<td>December 8, 1972</td>
<td>At Midway Airport, Chicago</td>
</tr>
<tr>
<td>Rep. Larry McDonald (D-Ga.)</td>
<td>September 1, 1983</td>
<td>Midflight destruction of KAL. Flight 007 over Sea of Japan</td>
</tr>
<tr>
<td>Rep. Mickey Leland (D-Texas)</td>
<td>August 7, 1989</td>
<td>On relief mission to Ethiopia</td>
</tr>
</tbody>
</table>
Some of the following citations do not contain page numbers because they were obtained from electronic libraries.

**SUMMARY**


**CHAPTER 1—As TIME GOES BY**

1. NTSB, Passenger Questionnaires, Docket Number: SA-509.
9. NTSB, "Cabin Safety in Large Transport Aircraft."
IN THE UNLIKELY EVENT...

13. Letter from Michael Rioux, vice president, engineering, maintenance, and materiel, Air Transport Association of America, to Federal Aviation Administration, Office of the Chief Counsel, 6 March 1996.

CHAPTER 2—MISSING IN ACTION

2. Ibid.
3. Ibid.
24. National Civil Aviation Review Commission, "Avoiding Aviation Gridlock and Reducing the Accident Rate."
25. Jeffrey Shane, assistant Secretary, Transportation Department, testimony to Senate Commerce, Science, and Transportation Subcommittee on *Aviation*, 11 September 1991.
26. ATA statistics.
30. National Civil Aviation Review Commission, "Avoiding Aviation Gridlock and Reducing the Accident Rate."
31. Ibid.
32. Ibid.
33. Ibid.
39. National Civil Aviation Review Commission, "Avoiding Aviation Gridlock and Reducing the Accident Rate."
46. Phillips, "FAA: No Quick Fix on Fuel Tanks; Agency Creates Unit to Study Safety; Short-Term 747 Action Rejected."


53. Representative Bud Shuster, remarks at hearing of the House Transportation and Infrastructure Subcommittee on Aviation, 1 February 1995.

54. Schiavo, Flying Blind, Flying Safe, p. 87.

55. Ibid., p. 153.


59. Hearing before the House Transportation and Infrastructure Subcommittee on Aviation, 25 June 1996.

CHAPTER 3—THE LIFE-AND-DEATH EQUATION


4. Miller, "Mother's Emotional Wounds Linger."


6. Ibid.

7. Miller, "Mother's Emotional Wounds Linger."


9 Ibid.


12. Miller, "Mother's Emotional Wounds Linger."


14. Testimony of Barry Sweedler, FAA, to the House Transportation and Infrastructure Subcommittee on Aviation, 1 August 1996.

15. The Public Works and Transportation Committee was renamed the Transportation and Infrastructure Committee in 1995.


17. Yenckel, "Are Babies Safe in the Air?"

NOTES

22. Ibid.
23. Letter read by Representative Jolene Unsoeld, from The Congressional Record, 7 October 1993.
24. NTSB, safety recommendation to FAA administrator James Busey.
27. Coughlin, testimony to House Public Works and Transportation Subcommittee on Aviation.
29. The Congressional Record, 7 October 1993.

CHAPTER 4—THE ERRANT ARCS

2. Ibid.
3. Ibid.
4. Ibid.
6. No byline, "Special Report: Dissection of a Disaster."
8. Ibid.
10. Ibid.
11. Ibid.
IN THE UNLIKELY EVENT...

23. Ibid., p. 47.
33. NTSB Public Hearing on TWA Flight 800, Systems Group Report, p. 36.
41. Frederick T. Rall, Jr., technical director, deputy for engineering, memo to AFLC/MMK, 5 February 1987.
43. Wojnar to Anderson.
44. Griffin, "Aviation Detective Story: Experts Track the Spark of Potential Killer."
45. Ibid.
46. Jones, "Raiders of the Lost Arc: How to Shoot Down an F-16 with a BB Gun."
47. Letter from Representative John Dingell to the FAA, 5 October 1988.
NOTES


55. U.S. Department of Transportation, United States Coast Guard, "Chief of Staff's Decision Letter on Coast Guard Air Station St. Augustine's Aviation Class A Mishap Involving E-2C CGNR 3501," 15 April 1991.


60. Hauchette, "Whistleblower Theorizes Defective Wiring Doomed TWA Flight 800."


CHAPTER 5—OTHER HOLES IN THE SAFETY NET


8. Wald, "Ambitious Update of Air Navigation Becomes a Fiasco."


10. Ibid. The breakdown: $2.6 billion on the original AAS plan, about $1.1 billion of which is salvageable; $160 million during fiscal 1998 and 1999 to replace the Host hardware; $655 million for four interim projects to keep the system running; $2.23 billion for the Standard Terminal Automation Replacement System (STARS) project; $1.9 billion for the Display Systems Replacement (DSR) project.


21. Cohen, statement before the House Transportation and Infrastructure Subcommittee on Aviation.


23. Cohen, statement before the House Transportation and Infrastructure Subcommittee on Aviation.


35. Testimony of Mike Fanfalone to the Civil Aviation Review Commission, 8 October 1997.
44. Ibid.
45. NTSB, "Safety Issue: Runway Incursion/Ground Collision of Aircraft," downloaded from www.ntsb.gov: "The FAA has made progress in implementing actions to reduce runway incursion accidents and incidents. The FAA has made some progress in the installation of ASDE III systems, but more needs to be accomplished." Specifically, the FAA had made an unacceptable response to A-91-111. That recommendation called for the FAA to "redefine the airplane certification coverage compliance standards for anticollision light installations to ensure that the anticollision light(s) of an aircraft in position on a runway are clearly visible to the pilot of another aircraft preparing to land or take off on that runway."
46. Marchak, "FAA Fumbled Plan to Cut Runway Errors, House Told."
47. Marks, "Jammed U.S. Runways Increase Close Calls."
48. Marchak, "FAA Fumbled Plan to Cut Runway Errors, House Told."

### CHAPTER 6—THE WRETCHED SPIRIT OF MONOPOLY

1. NTSB accident report, p. 154.
2. Ibid., pp. 8-10.
3. Ibid., p.105.
4. Ibid., pp. 154-155.
6. NTSB accident report, pp. 92-93.
7. Ibid., p. 85.
10. Ibid., pp. 157-158.
12. Ibid., p. 162
13. Ibid., pp. 105-106
15. NTSB accident report, p. 120.
34. NTSB accident report, pp. 8-10.
36. NTSB accident report, p. 52.
38. NTSB accident report, p. 65.
39. Ibid., p. 110.

**CHAPTER 7—CONCLUSION: SAFETY ON A SHOESTRING**


94
February 1998.


8. Ibid.


10. Ibid., p. 51.

11. Testimony of Albert H. Prest, vice president of operations, Air Transport Association, at NCARC hearing, October 6, 1997: "You can also go one step further and develop legislative protection against public disclosure of safety data obtained during the discovery process. We'd like to see that, too."


13. Ibid., p. 55.


