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Consensus on Need for FAA Guidance Helps Propel Era of Director of Safety

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Flight Safety Foundation is an international membership organization dedicated to the continuous improvement of aviation safety. Nonprofit and independent, the Foundation was launched officially in 1947 in response to the aviation industry's need for a neutral clearinghouse to disseminate objective safety information, and for a credible and knowledgeable body that would identify threats to safety, analyze the problems and recommend practical solutions to them. Since its beginning, the Foundation has acted in the public interest to produce positive influence on aviation safety. Today, the Foundation provides leadership to more than 850 member organizations in more than 140 countries.

Consensus on Need for FAA Guidance Helps Propel Era of Director of Safety

The role of director of safety — as an airline-management position that reports directly to the chief executive officer — has become an important element of safety oversight in U.S. commercial air transport. Regulators, airlines and pilots have divergent viewpoints about methods of compliance with the requirements of this position in U.S. Federal Aviation Regulations. During 1999, several organizations jointly made recommendations on qualifications, authority and duties, and the U.S. Federal Aviation Administration issued guidance material.

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Les Blattner

Airline pilots in the United States sometimes define "margin of safety" in commercial air transport as the difference between the minimum standards set by the U.S. Federal Aviation Administration (FAA) and self-imposed standards of airlines.[1] This definition implies that significant reduction of the low, but static, accident rate of recent years will require airline managers in safety leadership roles to be innovative agents of change.

Government and industry achieved the current margin of safety by many methods. In recent years, the structure of airline safety programs and their management have received increased attention. Interest has focused on integrated planning, execution and monitoring of safety-related activities and the safety culture. (See "High-level Safety Oversight Has Historical Precedents" on page 2.)

Part of the discussion has focused on the role of director of safety (DOS), one of five positions required by FAA for management of U.S. air carriers that operate under U.S. Federal Aviation Regulations (FARs) Part 121. (The other positions are director of operations, chief pilot, director of maintenance and chief inspector.)

Widely seen as an important advance in the evolution of air-carrier safety, the DOS position has generated controversy because of its many implications for airline operations. Some aviation leaders have advocated flexibility and freedom for airlines to shape the DOS position and its requirements to their needs. Others have advocated a more specific definition of the DOS position and its requirements.

This article explores industry perspectives of the DOS-related FARs and two important developments — a consensus recommendation to FAA by three organizations about a proposed advisory circular (AC) on the DOS position and FAA's new joint flight standards handbook bulletin for air transport and airworthiness for FAA principal inspectors and their assigned air carriers. (See "U.S. Federal Aviation Administration Issues Director of Safety Bulletin" on page 6 and "Three Aviation Groups Recommend FAA Guidance on Director of Safety" on page 10.)

Work toward the consensus was begun in May 1999 by the Air Line Pilots Association, International (ALPA), the Air Transport Association of America (ATA) and the Regional Airline Association (RAA).

John O'Brien, ALPA's director of engineering and air safety, said that ALPA in early 1999 proposed to FAA a draft AC and regulatory amendments (a draft notice of proposed rule making

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High-level Safety Oversight Has Historical Precedents

The current level of U.S. air carrier safety was eight decades in the making, involving high costs in resources and lessons learned from accidents. Some industry leaders believe that the requirement for a director of safety (DOS) also will become a milestone of U.S. aviation history.

Former U.S. Federal Aviation Administration (FAA) Administrator David Hinson said, "Some 20 years ago, we had 220 million airline passengers per year with one fatal accident about every 820,000 departures. Today, we have a fatal accident about every 1.82 million departures. That means we've doubled the number of airline passengers while reducing the [rate of fatal accidents] by about half.

"When you think about that, it's a remarkable accomplishment. This is thanks to efforts made in safety by the government, industry and commercial pilots all working together. But what's the challenge in the year 2000? I think [the challenge] is to do between now and 2017 what we did between 1960 and 1999. Yet even at today's accident rates, if they stay as they are, we'll be experiencing a worldwide commercial hull loss every week to 10 days in the new millennium. Should such a statistic occur, it will be unacceptable.

"We need to further reduce accidents with better, more advanced training and continued enhancement of an airline's safety culture. The establishment of a proactive safety culture within the airlines has, and will, make a considerable difference. In that regard, the director of safety in the [U.S. Federal Aviation Regulations] is a strong element that most assuredly benefits every airline, regardless of size."[1]

In the early decades of air transport, each pilot was responsible for the aircraft's safety. This arrangement was relatively simple, but inadequate. There were no uniform federal or state requirements[2] (or record-keeping procedures) concerning how an operator should conduct business safely. This meant that airlines were not prohibited from using obsolete aircraft or taking cost-cutting measures that could foster marginal maintenance or unsafe operations.

By the 1920s, some operators primarily were entrepreneurs with "get rich quick" schemes; the lack of effective regulation of aviation safety during this era is well documented in the annals of early aviation.[3]

The first federal authority over the airlines was established by the Air Commerce Act of 1926. The law set standards for airline performance and competition, and provided the foundation for many current regulations. Nevertheless, the entrance of numerous new airlines in the 1920s and 1930s produced a competitive economic climate. Some historians believe that the act had an effect directly opposite to the legislators' intention. That is, rather than enhancing aviation safety, safety problems worsened because of poorly equipped and poorly trained pilots, and the accident rate and the incident rate increased.[4]

The McNary-Watres Airmail Act of 1930 — which authorized changes in the fees paid to airlines for airmail services (paying by available cargo space rather than a pound-per-mile rate), route structures and contracting standards — included provisions to enhance safety (such as incentives for airlines to use multiengine airplanes and to update navigation technology). The law gave then-U.S. Postmaster General Walter F. Brown extraordinary power over the airline industry by issuing airmail contracts and by setting requirements for pilots and equipment.[5]

Brown's procedures for awarding airmail contracts, and the airline industry, came under investigation by the U.S. Senate in 1933, however. The federal government then canceled all airmail contracts that had been signed with airlines in 1930, and assigned U.S. Army pilots to transport the mail in February 1934. Many of these aviators had flown the earliest airline mail routes in 1926. Yet in the first two weeks after the military pilots began flying the mail, five pilots were killed, seven pilots were seriously injured and eight airplanes were destroyed. Six more military pilots were killed in aircraft accidents during the second month of flying the mail. In May 1934, airlines resumed transporting airmail.

Despite greater external regulation of airline operations in the late 1920s and early 1930s, fatal accidents continued, as in the following example.

Historian George Hopkins[6] said: "What sent Joe Livermore and his copilot, Art Haid, into the midst of an 80-mile-per-hour [129 kilometer-per-hour] winter gale on the night of Dec. 18, 1936? En route from St. Paul [Minnesota, U.S.] to Spokane [Washington, U.S.] in a Northwest Airlines (TWA) Lockheed 10 carrying a cargo consisting solely of Christmas mail, they made their last radio contact at 3 a.m., reporting over what they thought might be Elk River, Idaho. They were off course, overdue and nowhere near their destination."[7] Both pilots were killed in an accident during that flight, said Hopkins.

Several U.S. representatives proposed designating airlines as "common carriers," rather than using airlines as private contractors. When President Franklin D. Roosevelt supported the proposal and drafted legislation, the bill was passed as the Civil Aeronautics Act of 1938, creating the U.S. Civil Aeronautics Authority. The law assigned safety functions to one authority, established one administrator and created the U.S. Air Safety Board. The focus on externally based solutions for improved airline safety continued, however.

In 1940, the agency was divided into the U.S. Civil Aeronautics Administration (CAA) and the U.S. Civil Aeronautics Board (CAB). The CAB assumed the functions of the Air Safety Board.[8] The CAB also continued the pursuit of improved aviation safety primarily through the use of regulatory powers.[9]

After World War II, some leaders of U.S. civil aviation began to envision what is now called "proactive safety" as a fundamental airline management strategy — seeking to prevent accidents through internally generated efforts such as improved pilot training and better aircraft maintenance programs.[10] In 1957, during the year after two commercial airline aircraft collided over the Grand Canyon with 128 fatalities, the U.S. Congress passed laws creating FAA to establish and enforce safety regulations as the successor to the CAB.[11]

Efforts to improve the safety of air transport — by federal agencies such as FAA and the U.S. National Transportation

Safety Board (NTSB) working with pilots, manufacturers and airlines — led to a steep decline in the accident rate from about 1960 to 1985. This rate reached a low and relatively static level by the 1990s, but accidents continued to occur as the volume of traffic increased. Air Transport Association of America records[12] indicate that from 1946 through 1998, a total of 1,969 aircraft accidents occurred among U.S. airlines.

In the early 1990s, aviation leaders also focused on commuter operations, prompted by 14 fatal accidents (56 fatalities) involving scheduled commuter flights and commuter airline training flights[13] from December 1991 to January 1994. Despite decades of safety improvements by government and industry, accident rates for scheduled commuter airlines — operating then under FARs Part 135 — remained at twice the rate of airlines operating under FARs Part 121.[14]

The search for better methods of preventing accidents has continued in many formal industry meetings and informal meetings since the 1960s.[15] By the 1980s, some airlines voluntarily began to design and implement management positions — similar in concept to the DOS — to be the focal point of all aspects of operational safety.[16]

In the late 1980s, the Air Line Pilots Association, International (ALPA) proposed that FARs Part 135 commuter airlines be regulated under the more stringent requirements of Part 121.[17]

FAA's agreement with this proposal in 1995 prompted substantial amendments to Part 121, commonly known as the commuter rule.[18]

During the 1990s, FAA also developed programs (or encouraged airlines to develop and adopt programs) such as the Advanced Qualification Program (AQP),[19] crew resource management (CRM) training,[20] internal audits,[21] the Air Carrier Voluntary Disclosure Program,[22] altitude deviation programs[23] and flight operational quality assurance (FOQA)[24] programs.

Meanwhile, there were significant advances in flight-deck technology that have enhanced air transport safety — such as the terrain awareness and warning system (TAWS)[25] and traffic-alert collision avoidance system (TCAS II).[26]♦

— Les Blattner

Notes and References

1. Hinson, David. Interview with Blattner, Les. Chevy Chase, Maryland, U.S., July 14, 1999.

2. Heppenheimer, T.A. *Turbulent Skies: The History of Commercial Aviation*. New York: John Wiley & Sons, 1995, 10–14. Before the Air Commerce Act of 1926, some of the earliest aviation regulations in the United States applied to pilot training and aircraft maintenance for airmail service.

3. Hopkins, George E. *Flying the Line: The First Half Century of the Air Line Pilots Association (ALPA)*. Washington, D.C., U.S.: Air Line Pilots Association, International (ALPA), 1982. *The Airline Pilots, 1982–86: A Study in Elite Unionization.* ALPA, 1998. Marriott, Leo. *80 Years in Aviation*. ALPA, 1997.

4. National record-keeping on aircraft accidents/incidents in the United States began in 1938, according to the Air Transport Association of America (ATA) and the U.S. Federal Aviation Administration (FAA). Newspapers, aviation history books and other publications contain information about early accidents. Based on such documents, FAA said that more than 30 U.S. pilots were killed while flying each year from 1924 through 1937.

5. Heppenheimer, 54–64. Editors of American Heritage. *The American Heritage History of Flight*. American Heritage Publishing Co., 1962, 244–246.

6. Hopkins. *Flying the Line*.

7. Hopkins. *Flying the Line*, 31.

8. U.S. Civil Aeronautics Board. "Executive Summary." *Aeronautical Statutes and Related Material*. Revised June 1, 1954.

9. Through Congressional Reorganization Plans III and IV in 1940, CAB formally established U.S. Civil Air Regulations that required aircraft and crews to meet minimum standards.

10. For example, the Truman Commission report in 1952 discussed air safety and pilot training. Recommendation 24 in Volume 2 (page 29) said: "Every flight crew should be required to have frequent drills in instrument and emergency procedures. This can be accomplished in part in flight simulators. These flight simulators should be located at convenient points and should be available to all operators on a fair basis." This led to airlines increasing pilot training and creating training centers. Maintenance programs were being systematically standardized and became more sophisticated after World War II. In the late 1940s, some airlines began using flight data recorders that recorded on foil five or six federally mandated parameters — such as airspeed, vertical acceleration and heading.

11. ATA. *ATA Airline Handbook*. The Federal Aviation Act of 1957, which created the Federal Aviation Agency, authorized the installation of more long-range radar systems in the United States and a system for separation of large commercial aircraft throughout all phases of flight.

12. ATA, the trade association of the principal U.S. airlines, was founded by 14 airlines that met in Chicago, Illinois, U.S., in 1936.

13. Hall, Jim (chairman of the U.S. National Transportation Safety Board [NTSB]). Letter to FAA Administrator David Hinson, Nov. 30, 1994. The letter contained this NTSB statistic.

14. Based on FAA accident data for 1994, comparing accidents involving U.S. Federal Aviation Regulations (FARs) Part 121 operators and Part 135 operators.

15. For example, since 1960, federal aviation officials have met regularly with representatives of the aviation industry through the Aviation Rulemaking Advisory Committee and through a committee process at the Radio Technical Commission for Aeronautics (RTCA). In 1996, the Integrated Safety Strategy Team (ISST) was established, involving representatives of aircraft manufacturers, engine manufacturers, the Aerospace Industries Association, ATA and ALPA. ISST began to develop

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the commercial aviation industry safety agenda. In October 1997, ISST was renamed the Commercial Aviation Strategy Safety Team (CASST) and a major safety initiative began based on accident investigation research conducted through FAA's Safety Analysis Team. CASST brought together representatives from FAA, the U.S. National Aeronautics and Space Administration (NASA) and industry to form the Joint Safety Analysis Steering Committee, later renamed the Commercial Aviation Safety Team (CAST). The CAST process included use of a Joint Safety Analysis Team (JSAT), employing technical specialists from CAST organizations to analyze safety data. JSAT analyses are used to help identify high-leverage intervention strategies that would become part of coordinated industry/government safety action plans. The CAST process also includes Joint Safety Implementation Teams (JSITs) that study intervention feasibility, develop projects and plans, and implement interventions.

16. At the Aviation Safety Summit in January 1995, U.S. Transportation Secretary Federico Peña requested that U.S. airlines voluntarily add a director of safety (DOS) position to their management structures. Many U.S. airlines operating under FARs Part 121 had a DOS position before FARs Part 119 became effective in February 1997.

17. ALPA is a union representing 52,000 pilots who fly for 51 airlines in the United States and Canada. Founded in 1931, ALPA is chartered by the American Federation of Labor–Congress of Industrial Organizations.

18. ALPA proposed regulatory changes called One Level of Safety in the late 1980s. ALPA generally said that airlines operating under FARs Part 121 and FARs Part 135 should operate under Part 121, the standards that had applied to operators of aircraft that have more than 30 seats or maximum takeoff weight greater than 7,500 pounds (3,400 kilograms). FAA in 1995 completed amendments to FARs Part 121 — known as the commuter rule — requiring Part 135 airlines to operate under Part 121 if they provided scheduled service in a turbojet of any capacity or in airplanes with a passenger capacity of 10 seats to 30 seats.

19. FAA's Advanced Qualification Program (AQP) is an alternative training program that airlines may use for qualifying, training, certifying and otherwise ensuring competency of crewmembers who operate under FARs Part 121 and Part 135.

20. Crew resource management (CRM) is a training concept that emphasizes methods of effective communication, teamwork, the use of all available resources and other principles that improve crewmember interaction, performance and operational safety.

21. FAA AC 120-59, *Voluntary Air Carrier Internal Evaluation Programs*, provides guidelines for conducting internal audits of safety policies and procedures.

22. In March 1990, FAA announced in the Air Carrier Voluntary Disclosure Program a national policy that encourages more voluntary self-reporting by airlines, providing FAA information about industry compliance with regulations. Under the policy, an operator that discovers noncompliance with a regulation is required to promptly correct the noncompliance, and to report the noncompliance to FAA.

23. The USAirways (now USAir) program from September 1990 to November 1991 studied flight crew compliance with altitude assignments from air traffic control and related flight deck procedures.

24. Flight operational quality assurance (FOQA) is a program for obtaining and analyzing data recorded in flight operations to improve flight-crew performance, air carrier training programs and operating procedures, air traffic control procedures, airport maintenance and design, and aircraft operations and design.

25. The earliest ground-proximity warning systems (GPWSs), introduced in the early 1970s, were onboard devices that provided flight crews with a seven-second verbal warning for flight into mountainous terrain. The current generation — terrain awareness and warning systems (TAWS), a term adopted by FAA — includes AlliedSignal's enhanced GPWS (EGPWS) and other manufacturers' systems that provide terrain warnings that could prevent controlled-flight-into-terrain accidents. For example, EGPWS tracks aircraft position related to worldwide terrain data and aircraft performance, and applies "look ahead" algorithms based on present and predicted position to provide flight crews with a typical 60-second alert time before possible collision with terrain or flight-significant obstacles and structures.

26. Based on a congressional mandate — U.S. Public Law 100-223 — FAA in 1989 required traffic alert collision avoidance systems (TCAS II) on aircraft with more than 30 seats. TCAS II provides traffic advisories and resolution advisories (for vertical maneuvers) to avoid conflicting traffic, including coordinated resolution advisories for conflicts with other TCAS II-equipped aircraft. The regulation requires operators of aircraft with 10 seats to 30 seats to have TCAS I, which provides traffic advisories for conflicting traffic within the defined surveillance area.

[NPRM]) that would specify DOS qualifications and address other ALPA concerns about how airlines have complied with the DOS requirement.[2]

O'Brien said, "We met with FAA, and they told us that there was no way the agency would consider an NPRM on DOS anytime soon. So we talked with RAA, ATA and FAA and began the process of hammering out language on an AC that would be acceptable to all parties." An FAA official said that there has not been agreement on the need for such an NPRM.

Gary Davis, deputy director of FAA's Flight Standards Department of Air Transport, said that the reason is that FAA has not been convinced that there are DOS compliance problems or problems with the current FARs.[3]

During October 1999, FAA considered the language proposed by the three organizations in developing the flight standards handbook bulletin. Davis said that additional FAA guidance to airlines on the role of the DOS (and related structural issues in airline safety programs of Part 121 air carriers) would be available by early 2000.

FAA's Focus on DOS Position Complements Other Initiatives

Government efforts and industry efforts to learn more from analysis of accidents and to develop preventive strategies led to calls for greater autonomy of safety professionals within airlines. In 1994, for example, the U.S. National Transportation Safety Board (NTSB) published the *Commuter Airline Safety Study*.[4] The study identified a need for independent safety programs at air carriers.

In January 1995, the U.S. Department of Transportation convened aviation leaders at the Aviation Safety Summit[5] to identify safety problems and to develop solutions. Initiative 6.3.1, which emerged from this meeting, said that air carriers should "establish flight safety departments within all commercial carriers [and] develop criteria for effective implementation and operation of such departments, including definitions of authority and responsibility, which promote a safety culture."[6] A follow-up meeting in December 1995 — the Aviation Safety Initiative Review — analyzed work to date on the Aviation Safety Action Plan, established priorities and set a work agenda.

The White House Commission on Aviation Safety and Security[7] in 1996 and the National Civil Aviation Review Commission,[8] convened by the U.S. Congress in 1997, also were influential in shaping airline safety priorities, many of which became part of FAA's current program called Safer Skies — A Focused Agenda.[9]

Although Part 119.65 requires Part 121 operators to have a DOS, the complex process of structuring airline safety programs has continued to evolve since 1995. (See "U.S. Federal Aviation Regulations Part 119.65 and Part 119.67" on page 12.)

FAA's 1995 Proposal Sparked Diverse Industry Responses

A variety of aviation safety studies, strategies and methods emerged from the 1960s to the early 1990s, but a requirement for the DOS position was not introduced in the FARs until 1995.[10]

The genesis of this specific requirement can be traced to 1972, when NTSB officials and FAA officials began a series of communications about the structure of safety management at airlines. Table 1 (page 14) shows the evolution of efforts to define the DOS through excerpts compiled by NTSB from various documents that summarize the NTSB-FAA dialogue.

During his tenure from 1985 to 1995 as an NTSB member, John Lauber (now vice president of safety and technical affairs for Airbus Industrie of North America) was a strong DOS proponent.[11]

Lauber said, "It was during my time at [NTSB] that the evolution of thought regarding CRM [crew resource management] was taking us in the direction of looking far more critically at management's role in accident causation. To take up the cause for a central, high-level safety director seemed a natural thing to do under those circumstances. Airlines used to say [that] safety was everyone's responsibility — which was simply another way of saying [that safety] was no one's responsibility. While it is true that each employee has a duty to perform safely, that was a long way from saying that there is no need for a central safety authority."

The DOS position was introduced by FAA in an NPRM to amend Part 121. The amendments collectively were known as the commuter rule. The new regulations required operation under Part 121 by former Part 135 commuter operators that conduct scheduled passenger-carrying operations in airplanes with passenger-seating configurations of 10 seats to 30 seats, excluding any crewmember seat, and operators conducting scheduled passenger-carrying operations in turbojet airplanes, regardless of seating configuration.

The NPRM said that the DOS should be "an independent, full-time position." Amendment 121-251 to Part 121 said, "The FAA believes that an independent, full-time position is important if at all available or possible. However, [FAA] recognizes that in smaller operations, the director of safety function may be an additional function of a current manager. [Part] 119.65(b) provides flexibility in the requirements for positions and number of positions for management personnel, including the director of safety." The amendment contains a summary of industry responses to the proposed DOS position, which included the following comments (some commenters are not identified):

- United Express said that the creation of the DOS position is in the best interest of the flying public, but that the position's responsibilities will depend on airline size, equipment and type of operations;
- NTSB and several other commenters said that the director of safety should be independent from operational functions and have direct contact with the highest levels of management;
- One commenter said that the DOS position should be required for Part 135 certificate holders;

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U.S. Federal Aviation Administration Issues Director of Safety Bulletin

On Nov. 30, 1999, the U.S. Federal Aviation Administration (FAA) published a joint flight standards handbook bulletin for air transportation (HBAT 99–19) and airworthiness (HBAW 99–16) titled *14 CFR Part 121 and 135 Air Carrier Safety Departments, Programs, and the Director of Safety.* James Gardner, an aviation safety inspector in the FAA Air Carrier Operations Branch, said that the bulletin provides additional guidance for FAA principal inspectors and their assigned air carriers for a comprehensive and effective safety department, and suggested functions, qualifications and responsibilities of the director of safety (DOS) position.

For air carriers, compliance with the bulletin is not mandatory, Gardner said. HBAT 99–19 and HBAW 99–16 will remain in effect until the bulletin is incorporated into FAA Order 8400.10, *Air Transportation Operations Inspector's Handbook,* and FAA Order 8300.10, *Airworthiness Inspector's Handbook,* respectively. He said that the bulletin also responds to issues in Safety Recommendation A–94–201 of the U.S. National Transportation Safety Board (NTSB).[1]

Gardner said that although an FAA advisory circular (AC) about the DOS position has been under development, FAA recently decided to expedite guidance to inspectors via the bulletin process. Decisions about publishing an AC will be made later, he said.

"[Principal inspectors] will determine if this bulletin is applicable to their carriers and will set up meetings [with those carriers]," said Gardner. "The inspectors will ask the carriers if they wish to comply with the bulletin. The carrier makes the decision, informs the [principal operations inspector] and then implements changes."

The draft bulletin was distributed Sept. 28, 1999 for comment until Oct. 10, 1999. FAA received about 60 responses from airlines, directors of safety, FAA principal inspectors and industry groups — including the Air Line Pilots Association, International, Air Transport Association of America and Regional Airline Association.

Since 1995, when U.S. Federal Aviation Regulations (FARs) Part 119 specified management positions for operations under FARs Part 121 and FARs Part 135, two other HBATs have provided guidance to FAA personnel.

An HBAT published in 1996 included the following information about the DOS: "Each certificate holder that conducts operations under Part 121 must have a director of safety. This person is responsible for keeping the highest management officials of the certificate holder fully informed about the safety status of the certificate holder's entire operation. An independent, full-time position as director of safety is desirable if at all available or possible. However, for smaller operations, the director of safety function may be an additional function. [FARs Part] 119.65 (b) provides flexibility in the requirements for positions and number of positions for management personnel, including the director of safety."[2]

An HBAT published in 1997 included the following information about the DOS: "Each certificate holder that conducts operations under Part 121 must have a director of safety. This person is responsible for keeping the certificate holder's highest management officials fully informed about the safety status of the company. An independent, full-time position is required. However, in a small Part 121 operation, the director of safety functions may be an additional function of a current manager. Any request for a management deviation must be approved by AFS-200 [FAA Air Transportation Division]. (Note: Requests for one individual to fill this position for more [than] one certificate holder concurrently will not be considered.)"[3]

FAA's HBAT 99–19 and HBAW 99–16 said:

"1. Purpose. This bulletin provides guidance for principal inspectors and [FARs] Part 121 and [Part] 135 air carriers for the development of a comprehensive and effective safety department. Also, guidance is provided on the suggested functions, qualifications, and responsibilities of the Director of Safety position.

"2. Background.

A. In December 1994, [U.S.] Secretary of Transportation Federico Peña invited senior U.S. aviation officials to meet with him and [FAA] Administrator David E. Hinson in a safety conference in Washington, D.C. [, U.S.] More than 1,000 industry, government, and aviation officials met in various working sessions to address aviation safety issues. The major theme of the safety conference was that aviation safety is a shared responsibility. At the conclusion of the conference, participants agreed, among various initiatives, to take immediate and voluntary action to establish flight safety departments within all commercial carriers.

B. In December 1995, the FAA published a final rule which was titled "The Commuter Operations and General Certification and Operations Requirements." In the notice of the final rule, the FAA required that each certificate holder that conducts operations under [FARs] Part 121 have a Director of Safety. This person would be responsible for keeping the highest management officials of the certificate holder fully informed about the safety status of the certificate holder's entire operation. The FAA believes that an independent, full-time position is important if at all available or possible. However, the FAA recognizes that in smaller operations, the Director of Safety function might be an additional function of a current manager. [FARs] Part 119, Section 119.65(b) provides flexibility in the requirements for positions and the number of positions for management personnel, including the Director of Safety.

C. As part of the [U.S.] National Transportation Safety Board's (NTSB) 1994 safety study on commuter airline safety, the NTSB issued Safety Recommendation A–94–201 to the FAA. In part, this safety recommendation asked the FAA to revise the Federal Aviation Regulations to require that all air carriers operating under [FARs] Parts 121 and 135 establish a safety function, such as outlined in

Advisory Circular (AC) 120-59, *Air Carrier Internal Evaluation Programs*.

"3. Safety and Evaluation Programs.

A. As a matter of policy, the FAA encourages Part 121 and [Part] 135 certificate holders to identify, correct, and disclose instances of noncompliance with company procedures and FAA regulations. The FAA has previously developed guidance material (AC 120–59) that encourages certificate holders to develop internal evaluation programs as a tool for continuously monitoring and evaluating practices and procedures. The FAA believes that the development and implementation of a comprehensive and effective safety department that employs safety and internal evaluation programs will benefit both the certificate holder and the flying public.

B. Each Part 121 and [Part] 135 air carrier should have a safety department that addresses the broad range of risks involved in commercial aviation to include, but not limited to, flight, maintenance, and ground safety. Since operators vary in both size and scope of operations, it is appropriate to consider such criteria as the kind of operations involved, the number and type of airplanes used, and the areas of operations when determining the size and complexity of a safety department.

C. Any safety program should be designed to prevent personal injury and property losses resulting from accidents and incidents. The primary objectives of a safety program should be to motivate safe actions through establishment of a dynamic corporate safety culture; identify hazards to safe operations; work with other company departments to develop and implement safety interventions; monitor intervention strategies to validate effectiveness; and communicate the results throughout the air carrier.

"4. Director of Safety.

A. Functions.

(1) One of the functions of a Director of Safety is to develop and implement a comprehensive safety program. This safety program would include a safety structure and staff that is appropriate to the size of the operator, the kind and scope of operations, and the type and number of aircraft used in its operations. In all cases, it is important for the safety program to emphasize operational safety, including all aspects of flight and ground operations, maintenance programs and passenger safety.

(2) The Director of Safety should ensure that the necessary safety program elements have been developed, properly integrated, and coordinated throughout the air carrier. These elements include:

(a) A safety incident/accident reporting system.

(b) Accident/incident investigation.

(c) Safety audits and inspections.

(d) Internal evaluation program.

(e) Operational risk assessment program.

(f) Open reporting systems.

(g) Routine monitoring and trend analysis programs.

(h) Review of external evaluation programs.

(i) Safety committee(s).

(3) The Director of Safety should ensure that the safety program has been disseminated to all appropriate personnel and a detailed description of the safety program is incorporated in the appropriate manuals as described in [FARs] Part 121, Sections 121.133 and 121.135.

(4) The Director of Safety should ensure that adequate safety program management is maintained.

(5) To the greatest extent possible, the Director of Safety should be autonomous and separate from other departments and report directly to the chief executive.

(6) The Director of Safety should have direct access to the appropriate level of senior management and to all managers/supervisors on safety issues.

(7) The Director of Safety should provide safety concerns and findings to appropriate senior operations managers for appropriate corrective actions.

(8) The Director of Safety should be a primary participant in the development of an internal evaluation program and the resultant safety audit procedures.

(9) For [FARs] Part 121 operations and requirements, the Director of Safety position was established as a full-time position responsible for keeping the highest management officials of the certificate holder fully informed about flight, maintenance, and ground safety practices, procedures, and programs of the certificate holder's entire operation.

(10) Although [FARs] Part 135 does not establish a requirement for a Director of Safety position, these operators are still encouraged to designate a company management official or manager to monitor and evaluate flight, maintenance, and ground safety practices, procedures, and programs.

B. Qualifications.

(1) Training. It is highly desirable that the Director of Safety complete an aviation safety education program consistent with the position's responsibilities. If an individual has not completed such a program prior to appointment, the Director of Safety should attend one to supplement his/her experience. Participation in

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industry safety meetings, conferences or schools is considered an essential part of the continuing education of the Director of Safety. Training should also include such subject areas as:

(a) Corporate safety culture.

(b) The role of the safety director as advisor to senior management officials.

(c) Safety philosophy.

(d) Safety data collection and analysis programs.

(e) Risk management.

(f) Incident/accident prevention and investigation.

(g) Human factors.

(2) Experience. The person assigned as the Director of Safety should have extensive operational experience and professional qualifications in aviation. This would include the knowledge and understanding of the following:

(a) Aviation safety programs.

(b) Aviation safety standards.

(c) Safe aviation operating practices.

(3) Expertise. The person assigned as the Director of Safety should have established professional qualifications. These qualifications may be any of the following:

(a) An FAA commercial pilot [certificate] or airline transport pilot certificate.

(b) An FAA mechanics certificate.

(c) An FAA aircraft dispatcher certificate.

(d) Three years experience in a supervisory position with [an FARs] Part 121 or a scheduled [FARs] Part 135 air carrier.

(e) Three years experience in a position comparable to Paragraph 4.B.3.(d) above in U.S. military aviation operations.

(f) Three years experience in a supervisory position with a U.S. government department, board, or agency that deals directly with aviation matters.

(4) Knowledge. The person assigned as the Director of Safety should have a full understanding of the following materials with respect to the certificate holder's operation:

(a) The certificate holder's operations specifications.

(b) The manual required by [FARs Part 121] Section 121.133.

(c) All appropriate maintenance and airworthiness requirements of 14 [U.S. Code of Federal Regulations (CFR)] Chapter I (Parts 1 through 199).

C. Responsibilities. The Director of Safety responsibilities may include, but not be limited to, the following:

(1) Monitor and report to senior management on all air carrier activities that may have an impact on safety.

(2) Establish a reporting system which provides for a timely and free flow of safety-related information.

(3) Develop and maintain a database of incident/accident information to monitor and analyze trends.

(4) Monitor and evaluate the various safety and malfunction reporting systems to ensure appropriate integration and evaluation of data.

(5) Investigate and report on incidents/accidents and make recommendations to preclude a recurrence.

(6) Conduct safety audits and inspections.

(7) Solicit and process safety improvement suggestions.

(8) Develop and maintain a safety awareness program.

(9) Review and evaluate the adequacy of the emergency response plan.

(10) Monitor industry safety concerns that may have an impact on operations.

(11) Maintain close liaison with the FAA, NTSB and industry safety organizations and associations.

(12) Discharge their duties to meet applicable legal requirements and to maintain safe operations in accordance with [FARs Part 119] Section 119.65.

"5. Action.

A. Within 30 days of receipt of this bulletin, [FARs] Part 121 principal operations inspectors (POIs) shall ensure that their assigned air carriers are made aware of the information contained in this bulletin.

B. [FARs] Part 121 POIs shall review their assigned air carriers' manual(s) to ensure that the duties, responsibilities, and authority of the Director of Safety have been included.

C. [FARs] Part 121 POIs shall use the guidance material contained in this bulletin when reviewing the qualifications of an individual to serve full time in the Director of Safety position.

D. [FARs] Part 135 principal inspectors shall encourage their assigned air carriers to develop a safety department, appropriate to the size and scope of operations, that addresses the broad range of risks involved in commercial aviation to include, but not limited to, flight, maintenance and ground safety.

E. [FARs] Part 135 principal inspectors shall encourage their assigned air carriers to designate a company management official or manager to monitor and

evaluate flight, maintenance, and ground safety practices, procedures, and programs.

"6. Program Tracking and Reporting Subsystem (PTRS) Input.

A. Principal inspectors shall make a PTRS entry to record the actions directed by this bulletin with each of their assigned [FARs] Part 121 and [Part] 135 air carriers as outlined in HBAT 94–08, *Program Tracking and Reporting Subsystem (PTRS) Documentation of Action Required by Flight Standards Bulletins*. The PTRS entry shall be listed as activity code number 1381 and the "national use" field entry shall be HBAT9919.

B. Principal inspectors shall use the comment section to record comments of interaction with the operators.

"7. Inquiries.

A. AFS-200 [FAA Air Transportation Division] and AFS-300 [FAA Aircraft Maintenance Division] jointly developed this bulletin. Any inquiries from air carriers concerning this bulletin should be directed to their assigned principal inspector.

B. Any other inquiries regarding this bulletin should be directed to Jim Gardner (AFS-200) at [+1] (202) 267-9579 or William O'Brien (AFS-300) at [+1] (202) 267-3796.

"8. Location. This bulletin will be incorporated into the appropriate sections of FAA Orders 8400.10 and 8300.10. Until the material is incorporated into the appropriate handbook, inspectors should make written reference of this bulletin in the margin next to sections referencing safety programs and management personnel."♦

— FSF Editorial Staff

References

1. U.S. National Transportation Safety Board (NSTB) Recommendation A-94-201 said, "Revise the Federal Aviation Regulations to require that all air carriers operating under Parts 121 and 135 establish a safety function, such as outlined in [U.S. Federal Aviation Administration (FAA)] Advisory Circular AC 120-59, *Air Carrier Internal Evaluation Programs*. (Class II, Priority Action) (A-94-201) (Supersedes A-89-130)" This recommendation was issued Nov. 30, 1994. As of Oct. 27, 1999, NTSB had classified this recommendation "open–acceptable alternate action."
2. FAA. "Part 119: Certification of Air Carriers and Commercial Operators." HBAT-96-01, Jan. 22, 1996.
3. FAA. "Deviations from Part 119 for Management Personnel." HBAT 97-13 and Handbook Bulletin for Airworthiness (HBAW) 97-16, Sept. 18, 1997.

- One commenter said that the DOS should be excluded from enforcement actions;
- Big Sky Airlines and the National Air Transportation Association said that certificate holders operating relatively small fleets should be allowed to combine the DOS position with an existing position;
- Metro International Airways said that the requirement would be a burden to certificate holders with 10 employees to 15 employees, or one or two aircraft. The airline said that such operators should be allowed to determine which management personnel — especially the director of safety and chief inspector — are needed and to combine these and other positions;
- One commenter airline said that relatively smaller operations should be permitted to employ contracted safety officers or part-time safety officers who could function for more than one airline, reducing the financial burden associated with hiring additional personnel;
- Samoa Air said that the requirement for additional management personnel for certificate holders with three or fewer aircraft is burdensome and that a proper internal evaluation program should keep management informed of the certificate holder's safety status;
- Inter Island said that the safety officer should be any line pilot with six months of experience, that this position should be kept from the working ranks of line pilots and that this function should not be given to the chief pilot or director of operations;
- FAA said that major air carriers indicated that they already had established DOS positions responsible for overall safety and were fulfilling the function, and that Part 119.65(b) provides flexibility for establishing the DOS position; and,
- Other commenters indicated that current management personnel should be "grandfathered" (allowed to remain in their positions based on prior requirements) in the wake of the proposed rule's more stringent qualification and experience requirements.

NTSB Continues to Advocate Well-defined DOS at Airlines

NTSB Chairman Jim Hall said that NTSB continues to view the DOS position and related airline-safety structure as critical elements of airline-safety programs.[12]

Hall said, "It's been a long road with plenty of frustration along the way. The [NTSB] has worked hard on this issue

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Three Aviation Groups Recommend FAA Guidance on Director of Safety

[In October 1999, the Air Line Pilots Association, International; Air Transport Association of America; and Regional Airline Association reached a consensus on the following language proposed to the U.S. Federal Aviation Administration (FAA) for an FAA advisory circular (AC). The proposed AC would provide guidance to airlines regarding the appropriate role and qualifications of the director of safety, an airline position required in U.S. Federal Aviation Regulations (FARs) Part 119.65 for operations under FARs Part 121.]

Director of Safety

Qualifications — The person assigned as director of safety (the DOS) should have extensive operational experience in aviation. This would include knowledge of safety programs, standards and safe operating practices, knowledge of [FARs] and knowledge of airline operations specifications.

Training — It is highly desirable that the DOS have completed an aviation safety education program consistent with the position's responsibilities. If an individual has not completed such a program prior to appointment, the DOS should attend one to supplement his or her experience, if required. Participation in industry safety meetings, conferences or schools is considered an essential part of the continuing education of the DOS.

Training may include, but not be limited to, the following areas:

- Corporate safety culture;
- The role of the safety director as adviser to senior management;
- Safety philosophy;
- Safety-data-collection-and-analysis programs (e.g., [flight operational quality assurance (FOQA) programs[1]], [aviation safety action programs (ASAP)[2]], etc.)
- Risk management;
- Incident/accident prevention;
- Incident/accident investigation; and,
- Human factors and the decision-making process.

Management Plan

Each airline's written management plan should emphasize the importance of establishing a safety culture throughout the entire organization. Safety begins with the chief executive and continues through each employee of the company. In addition to a written management plan, it is desirable for the company to have a safety policy statement, signed by the chief executive.

The DOS should be autonomous and separate from other departments and report directly to the chief executive. The DOS must have direct access to the appropriate level of senior management and to all managers on safety issues. The DOS shall provide safety concerns and findings to appropriate senior operations managers for appropriate corrective actions. The DOS should also be responsible for the development of internal [safety] audit procedures.

Safety Department

Each airline's management structure should have a safety department. At smaller operators, this may of necessity be one person, the DOS. However, at larger air carriers the number and complexity of safety tasks will require that the DOS have a staff and serve as the manager of the safety department.

Since it is important for an air carrier's safety program to emphasize flight safety, the qualifications of the safety department staff are also important. Although the DOS may come from a variety of operational backgrounds, it is recommended that at least one member of the safety-department staff be trained (not necessarily current) in an aircraft that the airline flies.

Safety Program

General

The DOS should develop, integrate and coordinate a comprehensive safety program on behalf of the chief executive. Specifically, the DOS will ensure that:

- All the necessary program elements have been developed, properly integrated and coordinated;
- The program has been disseminated to all appropriate personnel;
- A detailed description of the program is incorporated in the appropriate air operator's manuals; and,
- Adequate program management is maintained.

Goal — The goal of the safety program is to prevent personal injury and losses resulting from accidents and incidents.

Objectives — The following are the objectives of the program:

- Motivate safe behavior through establishment of a dynamic corporate safety culture;
- Identify hazards to safe operations;
- Work with the appropriate operations management to develop and implement interventions;
- Monitor intervention strategies to validate effectiveness; and,
- Communicate the results throughout the company.

DOS Responsibilities

DOS responsibilities may include, but not be limited to, the following:

- Monitor and report on all carrier activities that may have an impact on safety;

- Establish a reporting system which provides for a timely and free flow of safety-related information;
- Develop and maintain a database of incident/accident information to monitor and analyze trends;
- Monitor and evaluate the various safety and malfunction reporting systems to ensure appropriate integration and evaluation of data;
- Investigate and report on incidents/accidents and make recommendations to preclude a recurrence;
- Conduct safety audits and inspections;
- Solicit and process safety-improvement suggestions;
- Develop and maintain a safety-awareness program;
- Review and evaluate the adequacy of the emergency-response plan;
- Monitor industry safety concerns which may have an impact on operations;
- Maintain close liaison with manufacturers, suppliers and contractors;
- Maintain close liaison with the [FAA] and international regulatory authorities, as appropriate; and,
- Maintain close liaison with industry safety organizations and associations.

Suggested Program Elements

- Safety incident/accident reporting system (e.g., [Aviation Safety Reporting Program (ASRP)[3]];
- Accident/incident investigation;
- Safety audits and inspections;
- Internal evaluation program;
- Open reporting systems;
- Routine monitoring and trend-analysis programs;
- Review of external evaluation programs (e.g., [FAA's Air Transportation Oversight System (ATOS)[4]]; and,
- Safety committee(s).♦

[FSF editorial note: The following notes are not in the draft language for the proposed AC on DOS; they provide definitions of a few terms in the draft language.]

— Les Blattner

Notes

1. Flight operational quality assurance (FOQA) is a program for obtaining and analyzing data recorded in flight operations to improve flight-crew performance, air carrier training programs and operating procedures, air traffic control procedures, airport maintenance and design, and aircraft operations and design.
2. Aviation safety action programs (ASAP) include several demonstration programs — partnerships involving the U.S. Federal Aviation Administration (FAA) and air carriers — that established incentives to encourage employees of the air carriers to disclose safety-related information to FAA and to identify possible violations of the U.S. Federal Aviation Regulations without fear of punitive legal enforcement sanctions.
3. The Aviation Safety Reporting Program (ASRP), administered by the U.S. National Aeronautics and Space Administration (NASA), promotes the voluntary reporting of operational problems and experiences by aviation professionals for inclusion in the Aviation Safety Reporting System (ASRS) database, with legally prescribed limitations on FAA's use of ASRS reports for enforcement purposes.
4. The Air Transportation Oversight System (ATOS) is a method of FAA oversight that uses system safety principles and systematic processes to assure that air carriers have safety built into their operating systems.

and takes the concepts of a safety officer and safety department seriously. We're gratified that the FAA has established the position of director of safety in [Part 119.65], and that the airlines have complied.

"But the mere fact of a [DOS] does not make a safety program that works. Several of the airlines have established a comprehensive safety program, while we have observed that others have lagged behind. It is the [NTSB's] policy that the FAA needs to define the qualifications and role of the safety officer, and the structure and function of the safety department.

"Finally, none of these officers or departments can make a difference unless the airline pays attention to the safety concerns that its safety department discovers and — most important — unless the airline acts on them. I hope that the new millennium will usher in a comprehensive and effective safety function at all airlines."

NTSB Vice Chairman Robert Francis said that NTSB also views the present DOS requirement in the FARs as one that should retain some flexibility in implementation.[13]

Francis said, "You can't micromanage this requirement because then it's just another regulation that airlines will more or less meet. This should be a living, breathing airline safety creation that prospers because of the uniqueness of the airline's operation.

"Any AC or other guidance materials will benefit the process only if they stimulate an airline's safety culture and make it stronger. Then you put meat on the bones without crippling

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U.S. Federal Aviation Regulations Part 119.65 and Part 119.67

[U.S. Federal Aviation Regulations (FARs) Part] 119.65, Management Personnel Required for Operations Conducted Under Part 121 of This Chapter

(a) Each certificate holder must have sufficient qualified management and technical personnel to ensure the highest degree of safety in its operations. The certificate holder must have qualified personnel serving full-time in the following or equivalent positions:

(1) director of safety;

(2) director of operations;

(3) chief pilot;

(4) director of maintenance; [and,]

(5) chief inspector.

(b) The [U.S. Federal Aviation Administration (FAA)] administrator may approve positions or numbers of positions other than those listed in paragraph (a) of this section for a particular operation if the certificate holder shows that it can perform the operation with the highest degree of safety under the direction of fewer or different categories of management personnel due to —

(1) the kind of operation involved;

(2) the number and type of airplanes used; and,

(3) the area of operations.

(c) The title of the positions required under paragraph (a) of this section or the title and number of equivalent positions approved under paragraph (b) of this section shall be set forth in the certificate holder's operations specifications.

(d) The individuals who serve in the positions required or approved under paragraph (a) or (b) of this section and anyone in a position to exercise control over operations conducted under the operating certificate must —

(1) be qualified through training, experience and expertise;

(2) to the extent of their responsibilities, have a full understanding of the following materials with respect to the certificate holder's operation —

(i) aviation safety standards and safe operating practices;

(ii) 14 [U.S. Code of Federal Regulations] Chapter I (Federal Aviation Regulations);

(iii) the certificate holder's operations specifications;

(iv) All appropriate maintenance and airworthiness requirements of this chapter (e.g., Parts 1, 21, 23, 25, 43, 45, 47, 65, 91 and 121 of this chapter); and,

(v) The manual required by [FARs Part] 121.133 of this chapter; and,

(3) Discharge their duties to meet applicable legal requirements and to maintain safe operations.

(e) Each certificate holder must:

(1) State in the general policy provisions of the manual required by [FARs Part] 121.133 of this chapter, the duties, responsibilities and authority of personnel required under paragraph (a) of this section;

(2) List in the manual the names and business addresses of the individuals assigned to those positions; and,

(3) Notify the certificate-holding district office within 10 days of any change in personnel or any vacancy in any position listed.

[FARs Part] 119.67, Management Personnel: Qualifications for Operations Conducted Under Part 121 of This Chapter.

(a) To serve as director of operations under [FARs Part] 119.65(a) a person must —

(1) hold an airline transport pilot certificate;

(2) have at least three years supervisory or managerial experience within the last six years in a position that exercised operational control over any operations conducted with large airplanes under Part 121 or Part 135 of this chapter, or if the certificate holder uses only small airplanes in its operations, the experience may be obtained in large or small airplanes; and,

(3) In the case of a person becoming a director of operations —

(i) for the first time ever, have at least three years experience, within the past six years, as pilot-in-command of a large airplane operated under Part 121 or Part 135 of this chapter, if the certificate holder operates large airplanes. If the certificate holder uses only small airplanes in its operation, the experience may be obtained in either large or small airplanes.

(ii) In the case of a person with previous experience as a director of operations, have at least three years experience as pilot-in-command of a large airplane operated under Part 121 or Part 135 of this chapter, if the certificate holder operates large airplanes. If the certificate holder uses only small airplanes in its operation, the experience may be obtained in either large or small airplanes.

(b) To serve as chief pilot under [FARs Part] 119.65(a), a person must hold an airline transport pilot certificate with appropriate ratings for at least one of the airplanes used in the certificate holder's operation and:

(1) In the case of a person becoming a chief pilot for the first time ever, have at least three years experience, within the past six years, as pilot-in-command of a large airplane operated under Part 121 or Part 135 of this chapter, if the certificate holder operates large airplanes. If the certificate holder uses only small airplanes in its operation, the experience may be obtained in either large or small airplanes.

(2) In the case of a person with previous experience as a chief pilot, have at least three years experience, as pilot-in-command of a large airplane operated under Part 121 or Part 135 of this chapter, if the certificate holder operates large airplanes. If the certificate holder uses only small airplanes in its operation, the experience may be obtained in either large or small airplanes.

(c) To serve as director of maintenance under [FARs Part] 119.65(a) a person must —

(1) hold a mechanic certificate with airframe and powerplant ratings;

(2) have one year of experience in a position responsible for returning airplanes to service;

(3) have at least one year of experience in a supervisory capacity under either paragraph (c)(4)(i) or (c)(4)(ii) of this section maintaining the same category and class of airplane as the certificate holder uses; and,

(4) have three years experience within the past six years in one or a combination of the following —

(i) maintaining large airplanes with 10 or more passenger seats, including at the time of appointment as director of maintenance, experience in maintaining the same category and class of airplane as the certificate holder uses; or,

(ii) repairing airplanes in a certificated airframe repair station that is rated to maintain airplanes in the same category and class of airplane as the certificate holder uses.

(d) To serve as chief inspector under [FARs Part] 119.65(a) a person must —

(1) hold a mechanic certificate with both airframe and powerplant ratings, and have held these ratings for at least three years;

(2) have at least three years of maintenance experience on different types of large airplanes with 10 or more passenger seats with an air carrier or certificated repair station, one year of which must have been as maintenance inspector; and,

(3) have at least one year of experience in a supervisory capacity maintaining the same category and class of aircraft as the certificate holder uses.

(e) A certificate holder may request a deviation to employ a person who does not meet the appropriate airman experience, managerial experience or supervisory experience requirements of this section if the manager of the [FAA] Air Transportation Division, AFS-200, or the manager of the [FAA] Aircraft Maintenance Division, AFS-300, as appropriate, finds that the person has comparable experience and can effectively perform the functions associated with the position in accordance with the requirements of this chapter and the procedures outlined in the certificate holder's manual. Grants of deviation under this paragraph may be granted after consideration of the size and scope of the operation and the qualifications of the intended personnel. The administrator may, at any time, terminate any grant of deviation authority issued under this paragraph.♦

[FSF editorial note: Operations conducted under FARs Part 135 require the operator to have a director of operations, chief pilot and director of maintenance, or equivalent positions, except for a certificate holder that uses only one pilot in its operations. FARs Part 119.69 specifies management personnel required for operations conducted under Part 135; FARs Part 119.71 specifies qualifications of management personnel for operations conducted under Part 135.]

carriers who choose to [operate] a safety department a little bit differently."

NTSB Member John Goglia said that one of the chief advantages of an effective DOS and related safety structure is the facilitation of communication.[14]

Goglia said, "The airline business over the past 30 years has become very vertical in structure. You don't get very effective cross-talk [among departments] until you get to the very top of the chain [of management authority].

"This compartmentalization [shows] why a DOS is needed and [why the DOS] should report directly to the [chief executive officer (CEO)]. The definition issue is not that complicated. The FAA left the requirement for the DOS basically undefined ... I think [that further definition] should be left up to the airlines. Still, the FAA should be diligent in providing the right level of oversight so that the goals of the program are met. So far, the rule as written seems to be working."

FARs Part 119 Describes Management Requirements

To understand the context of the DOS as the concept evolved, some background information on Part 119 is helpful. Part 119 has been called the "road map" that specifies how airlines and commercial operators are regulated. The NPRM for Part 119, issued October 1988, said that its purpose was to make Part 121 and Part 135 more effective.

The NPRM said that the new regulation would "clarify operations-specification requirements ... for persons who operate under Part 121 or Part 135."

FAA's Davis said that Part 119 originated with regulatory changes that were needed to implement U.S. airline deregulation.[15]

Davis said, "Back in 1978, as part of deregulation, the FAA was tasked to recodify its rules to incorporate deregulation.

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Table 1
Communication Related to Director of Safety

Date	Originating Agency	Position/Action
Dec. 27, 1972	NTSB	A recommendation said that U.S. Federal Aviation Regulations (FARs) Part 135 should be amended so that a "qualified individual can be delegated by each commuter air carrier to act in the capacity of safety officer and to monitor all safety aspects of the overall flight and maintenance operations."
Jan. 26, 1973	FAA	FAA said, "The director of operations will be assigned the responsibility of safety officer in the proposed amendment to [FARs] Part 135. [FAA is] waiting for [notices of proposed rule making (NPRMs)] to be issued as a result of the [FARs] Part 135 regulatory review program."
May 29, 1979	FAA	FAA said, "A separate position of safety officer was not proposed. We believe that the requirements for management personnel, [FARs Part] 137.37; their qualification, [Part] 135.39; and their duties and responsibilities as specified in the manual required by [Part] 135.23 preclude a specific requirement for a safety officer."
Jan. 9, 1990	NTSB	As part of the report on the investigation of the Delta Air Lines Flight 1141 accident (Aug. 31, 1988, at Dallas/Fort Worth International Airport, Texas, U.S.), NTSB Safety Recommendation A–89–130 said, "Initiate a joint airline industry task force to develop a directed approach to the structure, functions and responsibilities of airline flight safety programs with the view toward advisory and regulatory provisions for such programs at all [FARs] Part 121 airlines."
April 12, 1990	FAA	FAA agreed with NTSB Safety Recommendation A–89–130 and proposed that "… air carriers establish and conduct internal evaluation programs as an additional method of ensuring compliance with safety and security regulations."
April 27, 1990	FAA	FAA issued a national policy statement encouraging more self-policing by airlines and airline reporting of new types of information to FAA about what is happening in the industry, but the policy was only applicable under the following conditions: "An operator who discovers inadvertent noncompliance must promptly correct it and disclose it to the FAA, as well as take necessary corrective actions satisfactory to the FAA that preclude recurrence of similar noncompliance." FAA developed Advisory Circular (AC) 120–56 (now AC 00–58 *Air Carrier Voluntary Disclosure Program*) to recommend a program structure and to define key elements of model programs that air carriers can use.
Oct. 26, 1992	FAA	AC 120–59 *Air Carrier Internal Evaluation Programs* was issued, outlining voluntary means for airlines operating under FARs Part 121 and Part 135 to monitor the safety and regulatory compliance of their operations on a continual basis through a process of internal audits and inspections. In developing the program, FAA encouraged air carriers to establish an independent evaluation process that reports directly to senior management, to conduct internal surveillance on a regularly scheduled basis and to share the findings of the internal evaluation with FAA principal inspectors.
Oct. 22, 1993	NTSB	NTSB said that FAA did not address the intent of Safety Recommendation A–89–130 to initiate a joint FAA/airline/industry task force to develop the criteria for airline flight safety programs. NTSB said, "The FAA's response addresses self-policing by the airlines of regulatory issues. Our intent was for the FAA to work with the airlines to develop programs that would address, in part, the 'non-regulatory' safety issues that were addressed in the Delta [Air Lines] Flight 1141 accident report." NTSB classified FAA's response as "open–unacceptable."
Nov. 30, 1994	NTSB	NTSB issued recommendations regarding commuter airline safety. NTSB reiterated support for the intent of voluntary self-disclosure and internal-evaluation programs. Nevertheless, NTSB said that there was concern that both programs were relying on the voluntary participation of airlines, especially considering the results of an air carrier survey that found that commuter carriers generally had not developed safety programs voluntarily that met the intent of AC 120–59. NTSB said that although AC 120–59 recommended that internal evaluation programs include an independent safety function with direct access to the highest level of management, no such function was required. NTSB said, "A mandatory airline safety program would greatly enhance a commuter air carrier's ability to identify and correct safety problems before they lead to an accident. [NTSB] believes that the FAA should revisit the [FARs] to require that all air carriers operating under Parts 121 and 135 establish a safety function, such as outlined in AC 120–59." NTSB classified Safety Recommendation A–89–130 as "closed–unacceptable, superseded by Safety Recommendation A–94–201" that said, "Revise the [FARs] to require that all air carriers operating under Parts 121 and 135 establish a safety function, such as outlined in AC 120–59, *Air Carrier Internal Evaluation Programs.*"
Feb. 2, 1995	FAA	The agency said that there was agreement with the intent of Safety Recommendation A–94–201 and that FAA would issue a related NPRM as part of the commuter rule, which proposed a new safety management position or function.

Table 1
Communication Related to Director of Safety *(continued)*

Date	Originating Agency	Position/Action
March 26, 1996	FAA	FAA told NTSB that on Dec. 20, 1995, FAA published the commuter rule to bring scheduled passenger operations in airplanes of 10 or more passenger seats and all turbojets under the requirements of FARs Part 121. The final rule amended FARs Part 119.65 to require Part 121 certificate holders to have a full-time safety-officer position. FAA said that this response addressed all elements of Safety Recommendation A–94–201.
July 15, 1996	NTSB	NTSB said "FAA amendment of [FARs] Part 119.65, included in the commuter rule, requires Part 121 air carriers to staff a full-time director of safety [DOS] position. However, the FAA did not mandate the establishment of a comprehensive, effective safety function, as requested in Safety Recommendation A–94–201. While [NTSB] recognizes that the elements of a comprehensive safety program are already described in the FAA's nonregulatory guidance material (AC 120–59), [NTSB] believes that the FAA should ensure the effectiveness of an air carrier safety program not only by establishing the requirement for a [DOS] position, but also by establishing safety-department-management qualifications, independence and functions (such as incident investigation, audit and safety-data analysis). The [NTSB's] recent experience has been that most air carriers have filled the [DOS] position but that there is wide variability in this position's functions and responsibilities. The [NTSB's] objective in issuing Safety Recommendation A-94-201 was to move beyond the mere requirement for a [DOS] position and toward the requirement for an effective safety program. While the [NTSB] appreciates the FAA's establishment of the [DOS] as a required management position, the [NTSB] requests that the FAA reconsider additional regulatory action on the form, structure and function of an air carrier safety department, much as the FAA reviews and accepts air carriers' training, operations, security and maintenance programs. Pending further action by the FAA, Safety Recommendation A–94–201 is classified 'open–unacceptable response.'"
Dec. 1, 1996	FAA	FAA said that it "reviewed its position with respect to this issue and has decided that additional regulatory action is not the best approach at this time. Variances in the size, scope, complexity and type of air carrier operations define the corresponding safety function. The FAA is satisfied with industry's response to incorporating a safety officer function in response to the [Aviation] Safety Summit recommendations. The FAA is currently working with industry to evaluate best practices, as well as safety officer and department functions and design. The FAA will issue guidance material, which defines the role and responsibilities of a safety officer and the safety department. It is anticipated that the guidance material will be issued by June 1997."
April 10, 1997	NTSB	NTSB said, "The FAA is satisfied with industry's response to incorporating a safety officer function in response to the Aviation Safety Initiative Review recommendations of December 1995. … Pending [NTSB's] review of the guidance, Safety Recommendation A–94–201 is classified 'open–acceptable alternate response.'"
July 16, 1997	FAA	FAA said, "The FAA had anticipated issuing this guidance material [about the role and responsibilities of a safety officer and the safety department] by June 1997. However, the guidance material is still under development and will be complete and issued by December 1997."
Oct. 14, 1997	NTSB	NTSB said, "Pending review of this guidance material, Safety Recommendation A–94–201 remains classified 'open–acceptable alternate response.'"
March 20, 1998	FAA	FAA said, "The FAA agrees that additional guidance material is warranted to define the role and responsibilities of a safety officer and the safety department but believes that this can best be accomplished in an [AC]. The FAA worked with the National Air Carrier Association, the National Air Transportation Association, the Air Transport Association of America and the Regional Airline Association to evaluate best practices related to a safety officer and the functions of the safety department. The work also included a review of the position description and actual qualifications of current directors of safety at member airlines of these organizations. The FAA anticipates that a draft [AC] will be published in the [U.S.] *Federal Register* by June 1998 for a 60-day comment period."
Oct. 19, 1998	NTSB	NTSB said, "The FAA anticipates that a draft AC [to define the role and responsibilities of a safety officer and the safety department] will be published in the [U.S.] *Federal Register* in the third quarter [of fiscal year 1999]. Pending issuance of the draft AC, Safety Recommendation A–94–201 is classified 'open – acceptable alternate response.'"
Aug. 3, 1999	FAA	FAA said, "The FAA worked with the National Air Carrier Association, the National Air Transport Association, the Air Transport Association of America and the Regional Airline Association to evaluate best practices related to a safety officer and the functions of the safety department. The FAA met with industry groups

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Table 1
Communication Related to Director of Safety *(continued)*

Date	Originating Agency	Position/Action
Aug. 3, 1999 *(continued)*	FAA	to solicit information associated with the position of director of safety. While these groups agree that it is important to designate a safety officer, they do not believe that the FAA should specify exact duties and responsibilities for this position. The FAA is continuing to develop guidance material concerning the qualifications, duties and responsibilities of the safety officer. The FAA has decided that it will publish this guidance material in the form of a handbook bulletin to principal operations inspectors for dissemination to the carriers. I believe that this action addresses the [NTSB's] concern, which was to disseminate guidance material on the role and responsibility of a safety officer to the carriers. It is anticipated that the handbook bulletin will be issued by November 1999."
Dec. 19, 1999	FAA	FAA said, "On Nov. 30, 1999, the [FAA] issued Joint Flight Standards Handbook Bulletin for Air Transportation and Airworthiness, HBAT 99–19 and HBAW 99–16, *14 CFR Part 121 and 135 Air Carrier Safety Departments, Programs and the Director of Safety.* The bulletin provides guidance for principal inspectors and [FARs] Parts 121 and 135 air carriers for the development of a comprehensive safety department. The bulletin also provides guidance on the suggested functions, qualifications and responsibilities for the director of safety position. I have enclosed a copy of the bulletin for the [NTSB's] information. I consider the FAA's action to be completed on [NTSB Safety Recommendation A–94–201], and I plan no further action."

Note: This information has been excerpted from NTSB and FAA documents to summarize communications and policy positions from January 1972 to December 1999.

NTSB = U.S. National Transportation Safety Board FAA = U.S. Federal Aviation Administration

Source: U.S. National Transportation Safety Board; Les Blattner

We came up with the interim [Special Federal Aviation Regulation (SFAR)] 38-2. Then, in the early 1980s, we developed the Part 119 project to take that special FAR and codify it into one part to set up the applicability.

"We wanted to clearly define how an airline operates. We were going to have requirements for the chief pilot, director of operations [and] director of maintenance, and give the certification requirements [to airlines]. [Part 119] was going to put in one location all the material necessary to start an airline for Part 121 and Part 135 [operations].

"By 1994, we had worked everything out when the commuter rule came along. Everything seemed to fit right into the applicability section. Since the rule changed [the definition of] scheduled Part 135 [carriers] from [a capacity of] 10 to 30 seats to only nine seats, we had to change the applicability anyway. Then, too, [the U.S. Department of Transportation] had informed us that our Special FAR [38-2] had to be retired. So everything came together to use [Part] 119 as the road map for the commuter rule and [Part] 121."

In 1995, Part 119 defined aspects of the five kinds of air carrier operations: domestic carrier, flag carrier and supplemental carrier (under Part 121); commuter operator and on-demand service operator (under Part 135).

Davis said, "Flight Standards decided that the management positions should be in [Part] 119 because those positions make an airline's day-to-day operations possible, and are applicable to other requirements, and might be applicable to future parts. Most of these positions already existed, except the [DOS].

"Before the commuter rule, the management requirements for [Part] 121 were limited to those carriers that engaged in supplemental operations. There were no management-personnel requirements listed for domestic [operators] and flag operators. We wanted to put all the personnel requirements in one place so that [operators] could see the subtle differences between Parts 121 and 135."

Thus, qualifications were defined for four of the required management positions — but no qualifications were defined for the DOS position. FAA's decision to issue the regulations in this manner — and the underlying reasons — became one of the points of contention within the airline industry.

Nevertheless, part of the explanation was regulatory expediency, simply because the DOS requirement was part of a large package of new requirements.

Davis said, "At the Safety Summit in Washington, D.C., in 1995, [U.S. Secretary of Transportation Federico Peña] asked the Part 121 carriers to voluntarily appoint a [DOS] and said that FAA would promulgate the requirement.

"We were concerned that we wouldn't be able to bring the rule in if it was loaded up with too many requirements. We were asked to put the DOS [position] in the rule quickly, and we did. But we didn't have time to do all the necessary

homework on it. We weren't in a position to know exactly what the requirements were and didn't have time to develop it. So we listed the DOS without requirements."

In May 1999, the consensus at FAA was that Part 121 air carriers were complying with the existing regulation requiring the DOS position; therefore, there was no perceived need for further definition or refinement, he said.

Davis said, "We haven't heard comments ... that there's a compliance problem. Airlines could ask [FAA] for an exemption, but they haven't. Flying safety is not the only safety involved with an airline. There's ozone safety, ground safety — they have building-safety problems.

"These directors of safety are handling a lot more issues than flying safety. The airlines are establishing the criteria that they want in this position. It may be that we will find some reason to put in some specific experience criteria. But as of right now, we do not have a mandate to do that. We are developing an AC for guidance to the airlines."

Pilot Union, Airlines Find Common Ground on DOS

In January 1999, ALPA believed that an amendment was needed to establish specific requirements that would define the DOS — just as Part 119.65 had defined the director of operations, chief pilot, director of maintenance and chief inspector.

ATA and RAA believed, however, that the absence of a detailed DOS definition — that is, the FARs as published — allowed individual airlines freedom to define the position in the most effective manner according to their own safety cultures.

In developing its position about the need for an amendment to the FARs, ALPA conducted a survey in 1996 and 1998 of its 53 Master Executive Council members (MECs) at airlines where ALPA represents pilots. The 1998 survey contained the following questions and a space for individual comments:

- "Does your airline have a corporate safety officer [CSO]?;
- "Briefly describe the corporate safety department structure of your airline;
- "Who does the chief safety officer directly report to?;
- "Are the central air safety chairman and other employee safety representatives actively used by the corporate safety structure?;
- "Is your carrier a code-share partner with another carrier? [Code sharing is the process in which airlines issue a ticket under one airline name for a trip in which some flight segments (codes) utilize the routes, aircraft and crews of other airlines (code-share partners). Prior to 1987, few international code-share arrangements had been developed by airlines. From 1994 to 1999, the number of code-share agreements between U.S. airlines and non-U.S. airlines grew from 61 to 163.];
- "If so, does your CSO have a formal relationship to the code-share partner CSO? Please describe;
- "What methods are established for the reporting of safety concerns by employees?;
- "Does the CSO possess any FAA certifications? If so, what type?; [and,]
- "What other type of background and training does your CSO have for his duties?"

O'Brien said that the survey was part of several ALPA efforts to develop more specific requirements and recommendations about the DOS position.[16]

"This wasn't our first effort at working on the DOS issues," O'Brien said. "In 1996, we surveyed the MECs about the DOS. What we learned was put into two recommendations to FAA. First, the MECs told us there should be an FAA requirement for the position. Secondly, they believed that the DOS had to have specific experience in safety with some form of formal safety education.

"We already knew that these safety officers wanted formal language in the FARs describing the position. But what we wanted was a firm reason for a safety director mandate. So the survey goal was to gain input from six areas: compliance with [Part] 119.65; effectiveness of airline safety structure; safety information and communication methods in the corporate chain; and experience and background training of the DOS. We saw this as a three-part effort that also included [a proposed AC] and a petition to FAA to amend [Part] 119.67 to provide specific DOS qualifications."

ALPA said that when the survey data were tabulated, the results indicated that opinions varied in terms of air safety culture and DOS functions.

O'Brien said, "The larger the carrier, the more sophisticated [was] the air safety department, with the DOS reporting directly to the CEO. The smaller the carrier, the [greater was the] tendency ... to not take the [DOS] position as seriously. Clearly the background of the [DOS], as well as the status afforded that individual, transmits a message to airline employees regarding the concept of safety. Management's enthusiasm for a [DOS] tends to permeate an airline."

O'Brien said that the MECs contacted during the 1998 ALPA survey (37 total air carriers) provided the following opinions:

- Eighteen carriers had identifiable safety relationships with their code-sharing partners;
- Nineteen carriers had effective safety structures;
- Three carriers had vacant DOS positions; and,
- Education and background of DOS incumbents were highly diverse.

(The ALPA survey did not solicit the opinions of airline-management personnel.)

ALPA's draft for a proposed AC said: "The [DOS] must be highly qualified and schooled in aviation safety programs and must hold an FAA [airline transport pilot], dispatcher or mechanic certificate. The [DOS] should have at least three years of air carrier operational experience in a position requiring the possession of the certification within the preceding six years and have completed an accredited aviation safety education program within one year of appointment. This program must be completed within two years of appointment, and the [DOS] must obtain annual continuing education in the form of attendance of industry safety conferences or schools."

Bill Bozin, senior director of safety for ATA, said that ATA began analyzing the DOS issue several years before FAA's formalization of the position in the commuter rule.[17]

Bozin said, "Early on in the decade, there was the Flight Incident Review Group that subsequently became the Flight Incident Analysis and Review Committee, comprising airline safety directors who met quarterly to go over safety issues. This was a chance for people to talk on a nonattributable basis about industry safety issues and work out solutions."

The 1995 Aviation Safety Summit process, however, accelerated the evolution of ATA's thinking about the DOS, he said.

"That's when we got the mandate for safety officers and then the rule," Bozin said. "As indicated, most of the major airlines already had some form of safety director prior to then. But where the rule and mandate had an impact was on the corporate structure of an airline's safety department.

"Many of these safety offices were not as large or robust as the new rules specified. With the additional emphasis given by [Part] 119.65, an equally important event took place within ATA. We decided to elevate our safety committee up to council status. That meant the council comprised the chief safety officers of all the major carriers. Furthermore, from an association viewpoint, [the change] meant that [the safety council] was on an equal footing with ATA's other two councils — the operations council and [the] engineering, maintenance and material council — receiving equal consideration and budgetary allocation."

He said that the ATA Safety Council, developed in the context of the DOS discussions, will have several benefits.

Bozin said, "When we can present our consensus view on issues, we are more effective with the FAA. We've most recently been working on code-sharing safety oversight of international carriers. We've been working with the [U.S. Department of Transportation] and we're very close to acceptance on a U.S. program where [non-U.S.] carriers will have to use U.S. safety standards when they have a U.S. partner. We also have consensus on the DOS issue."

When the commuter rule was issued, ATA — representing 28 major U.S. airlines — opposed any change to the manner in which Part 119.65 and Part 119.67 left open the details of how the DOS position would be implemented at individual airlines.

Al Prest, director of operations at ATA, said, "We're philosophically in agreement with others in the industry that there must be a senior safety executive reporting to the CEO of the airline. But some form of blanket rule for that position is less clear, as our members have distinctly different cultures, and what works for one carrier will not necessarily work for another.[18]

"[A blanket rule] would be like swapping working agreements — [that is,] where a Delta [Air Lines] contract for its pilots would also have to work for American [Airlines pilots] and United [Airlines] pilots. We're working with the FAA to make sure there's enough flexibility in the regulation for every culture. Yet at the same time, we don't want to dilute the process to a point where it's useless."

ATA instead favors a multifunctional DOS requirement that every airline can use effectively, said Prest.

"FAA needs to create a well-defined [DOS] objective," said Prest. "Once you have an objective, there should be a mechanism that allows an operator to say how the airline would meet the objective. This isn't some new idea, [the idea is] consistent with everything FAA does — for example, an operator applying for a new air carrier certificate.

"The operator must submit a letter to the FAA explaining how the airline will specifically comply with the FARs. [The issue is] as straightforward as that. You have to have a mechanism in place so the agency can say: 'OK, airline, we agree with how you're going to attain your objective. But it's your responsibility to prove that you can do what you say.' If the FAA stays with this philosophy, we will have a higher DOS compliance and much more effective rule."

U.S. Regional Airlines Had Concern About DOS Details

Walter Coleman, president of RAA, the trade group that represents U.S. commuter airlines, testified in the mid-1990s

against having too much detail in FAA's NPRM about the DOS. At the time, Coleman said that compliance with regulations beyond those already in the commuter rule would be a burden for RAA members.

Amendment 121-251 to Part 121 said, "Comair, ASA [Atlantic Southeast Airlines], Gulfstream [International Airlines] and RAA say that [Part] 119.67 does not provide any qualification requirement for the [DOS]. These commenters request that the FAA permit certificate holders to designate directors of safety based upon their needs and without an FAA approval process."

As of early 1999, RAA continued to oppose expansion of the DOS position by FAA.

Coleman said, "The RAA position from the beginning of this issue has always been that FAA should provide a performance objective stating what the DOS is responsible for. That's what the agency was after when [FAA] first published Part 119. The agency was trying to ensure that the airline did have someone designated for air safety [who] did have a clear reporting channel to senior management.[19]

"But RAA has never supported the concept of a [DOS] with a particular license, or perhaps even a formal education. We continue to view the [DOS] as someone who understands his or her responsibilities and can manage those issues. We're certainly not convinced that this has to be a formally defined position within the industry. What most of our members want is someone to identify and investigate safety issues before there is an accident or incident."

Early in 1995, the RAA Safety Council was established from about 30 of the commuter airlines' flight safety directors or equivalent positions.

Coleman said, "I thought I'd have a problem getting everyone to meet twice a year, but [members] voted to meet every quarter."

The council issued the following policy statement in June 1999:[20]

"RAA recommends that the FAA does not propose rule making to further define either the qualifications or the duties of a [DOS]. Instead, RAA *strongly* [emphasis in original] recommends that the FAA [create an] air carrier safety program advocacy office:

- "That creates, coordinates and evaluates [DOS] training programs and materials;
- "That is the liaison between FAA and industry directors of safety;
- "That is the only FAA office to render an opinion as to the qualification of any [DOS] candidate; and,
- "To which the present FAA Aviation Safety Program managers report."

The policy statement said that the proposed FAA office would be a resource for airworthiness, certification, operations, civil aviation security and hazardous materials (hazmat), air traffic services, and — with the U.S. Occupational Health and Safety Administration (OSHA) and the U.S. Environmental Protection Agency (EPA) — for aviation-related occupational safety issues and environmental safety issues.

The policy statement said, "RAA does not support rulemaking that would attempt to define and regulate the qualifications of the individual beyond that which is now required by [Part] 119.65. The current regulation allows air carriers to select the most qualified person to act as [DOS].

"Larger air carriers typically have a number of persons assigned to their safety department and reporting to the [DOS]. These staff members typically possess specialized skills that together cover a wide range of safety disciplines. Directors of safety may be chosen based, at least in part, on their management and communication skills. ... RAA also notes [that] the FAA has selected many key managers based primarily on the person's management [skills] and communication skills. Many of these FAA positions are well served by persons who do not hold an airman certificate and/or who do not have recent experience in a position requiring an airman certificate.

"Smaller carriers may need the management and communications skills even more so, as they must foster a safety culture across all functional areas within the company. As with larger carriers, the smaller air carriers have available specialized expertise within their organizations."

United Airlines' DOS 'Finds Truth, Facilitates Change'

ATA's largest member airline — United Airlines (UAL) — has had a formal safety officer position since the late 1950s and the airline currently operates a relatively large and sophisticated safety division.

Capt. Edmond L. Soliday, UAL vice president of corporate safety and security, said that 158 people in the division work in sections responsible for flight safety, occupational safety, environmental protection, quality assurance, code-share-partner audits and express-carrier audits.[21]

Soliday said, "[In] my division ... we find the truth and facilitate change. To do that, we must have impeccable integrity. We derive things from data, not opinion. I'm not the climb-the-tree guy. I can hire someone to do that [that is, to implement operational details]. I'm the facilitate-change guy. My job is to go out and sell the right thing to do. That does not come from a degree in any particular discipline; it comes from credibility. And credibility comes from knowing how United works."

From his experience, Soliday said that translating such a high-level position into many details in the DOS regulation would be unwise.

"The key air safety manager in an airline is the person [who] has the credibility and is articulate enough to convince management that change is necessary," said Soliday. "In a big airline, you can hire the technical people. But in a small airline, you have to have the technical [ability] and sales ability. That's where the struggle is on how to describe the DOS position.

"Then there's the question about a safety culture. You can have pilots who believe in safety, but that won't matter if the ground people don't feel the same way. If you don't have a safety culture growing on the ground, mechanics are going to bolt the parts on any way they want to, and it isn't going to matter that you have pilots [who] went to safety school. We have to convince 95,000 people that they believe in safety. That's what creating a safety culture means — and that's not an easy job."

For UAL, the limited scope of the FAA-industry dialogue about DOS qualifications and related issues has been a problem because of excessive attention to the flight-safety dimension, he said.

Soliday said, "My [division] is hugely different than flight safety. We used to have a flight-safety position and a ground-safety position, and a lot of things fell through the cracks."

He said that FAA does not have the same perspective of occupational safety issues, for example, that an airline has.

"Should a mechanic get hurt on the job, FAA would turn over the situation to OSHA," Soliday said. "Some [airline directors of safety] might fight [FAA for involving OSHA], but I've never had [a] problem, so we're open to [cooperation with] OSHA. If they would go out in left field [that is, conduct their investigation in a manner inconsistent with OSHA's lawful authority], I would fight them."

Soliday said that other reasons that FAA and industry groups have struggled with fine-tuning the DOS position have included inadequate communication about the real working environment for the DOS and failure to tap airline expertise in areas such as managing overlapping airline-safety issues — one of which is flight safety.

Soliday said, "What ticks me off [upsets me] is that a lot of us have been doing this for a living, but no one from FAA ever talked to us. We didn't talk to them about risk management or quality assurance, or as we did the job, where the overlaps were.

"All of a sudden, a lot of engineers [on Society of Automotive Engineers International (SAE), Aerospace Technical Committees] were telling us how to manage a safety department. ALPA and SAE have been the two biggest proponents for a DOS, but when they write [the details] out on paper, they're only defining a flight-safety position, not a director-of-safety position."

Role of DOS at Comair Evolves In Regional Air Carrier Setting

Comair, one of RAA's largest members, provided the following perspective as a regional airline that has complied with the requirement for a DOS in Part 121 operations in the years since FAA implemented the commuter rule. Six employees — including the DOS — primarily conduct the operational-safety functions. Plans call for three more employees to be added to Comair's safety department.

Ken Marshal, vice president of corporate safety for Comair, said that the airline had a position equivalent to the DOS position prior to the requirement in Part 119. Marshal accepted that position in 1994.[22]

Marshal said, "I've been everything from a line pilot to chief pilot to director of operations — [and] now my current [DOS] position. As [vice president] of corporate safety, I report directly to the president of the airline."

Marshal said that when he accepted the position, he did not have a safety staff. Instead, Comair safety functions were organized with safety representatives in each department.

"In those days we were still trying to figure out what our formal safety structure would be," said Marshal. "We originally started with [people in] flight safety and then added people in our ground safety [area,] and we mushroomed to include occupational health and safety, environmental protection and workers' compensation."

Marshal said that there is no single method for establishing an effective safety structure.

"We didn't try to reinvent the wheel [at Comair]," Marshal said. "We went to our code-sharing partner, Delta Air Lines, and other regional carriers, and took the best of the best. We're essentially the safety advocate for the airline. We're responsible for identifying any safety flaw or hazard through work with the different departments.

"We do the investigative work [on] all accidents and incidents that the airline may have. We have authority to make recommendations on corrective safety matters and follow through to make certain these are taken care of.

"If there is an issue of noncompliance, I have the authority to go [directly] to the president and say so. But we try to work [out safety issues] with the individual departments first. Thankfully, I have never had to go to the president with a safety problem that we could not work out."

Comair safety personnel have a wide range of tools, methods and programs engaged in the prevention of aircraft incidents and accidents.

Marshal said, "We're responsible for a number of programs, including the Comair communications log (CCL), [a computerized record of] any and every [event] that happens — whether to a pilot, flight attendant or a customer-service agent. We have a CCL coordinator within each department [who] prescreens [events] and then assigns them to be answered. I review every one of those [events] — about 150 each week. If there are safety issues, we cull those out and attack them from our safety perspective. We find out why they occurred, what was the cause and how do we stop [the issue] from happening again."

Comair also has a hazard-reporting system, an urgent-action program that identifies specific problems that must be resolved immediately.

For example, Marshal said a hazard report might indicate that a tug frequently drove within a danger zone that tugs should not enter.

"When such a report is made, we immediately go out and warn the driver," said Marshal.

Comair also has joined FAA's demonstration project for flight operational quality assurance programs (FOQA). FOQA is a program for obtaining and analyzing data recorded in flight operations to improve flight-crew performance, air carrier training programs and operating procedures, air traffic control procedures, airport maintenance and design, and aircraft operations and design. FOQA has enabled airlines to diagnose problems and to identify trends that can prevent an incident or accident.

Marshal said, "It's our responsibility to make certain that we are in step with what the industry is doing. We have to determine at what point in the future ... we should institute [FOQA] as part of our operational scenario."

Marshal said that the formal requirement for a DOS in Part 119.65 helps to prevent fragmentation of responsibility for safety.

"With so many people responsible for bits and pieces of air safety, the fragmentation [formerly] meant [that] no one person led the effort," said Marshal. "Now that we have a rule that says we will have a DOS, I think that not only solves the problem, [the rule is] very appropriate."

Nevertheless, Comair has agreed with the viewpoint that selection of a DOS should be left to each airline's discretion.

Marshal said, "The company has its own needs and culture, and every operation within our industry is different. Whether a small commuter or large major carrier, they will do whatever is necessary to fulfill their need and responsibility for a safety leader.

"Whether [in] flight safety or ground safety, the airline knows more about what [the company] needs than the federal government. I would be very hesitant to put any prerequisites on what type of experience [is] necessary in hiring a DOS. One size obviously does not fit all. I've seen very good managers who have no idea what safety is about, but they learn quickly and turn out to be good safety advocates."

Tom Monforte, Comair's safety coordinator (deputy DOS) formerly was a fighter pilot and a wing air-safety officer in the U.S. Air Force. He also has taken aviation-safety courses, including courses from the University of Southern California, U.S.

Monforte said that he has acquired a broader perspective of safety while interacting with federal agencies as a safety representative for Comair.[23]

"All of these agencies have a little bit different cut [viewpoint] on safety," said Monforte. "OSHA, for example, looks at an empty airplane as another ... work site. When people are aboard the plane, the FAA has jurisdiction. We advise the line managers and senior management on their safety posture. We recommend the types of programs [that] managers need to be running, investigate incidents and make recommendations for corrective action."

Monforte said that the role of the DOS as a management function is key and that flexibility is essential.

"[The safety department] has to fill the needs of senior management, so the way [the department is] organized — the criteria and so forth — has to be left up to the president of the company," he said. "To say you need a pilot in the job, or even a mechanic or dispatcher, means that you've limited yourself. You have OSHA, EPA, emergency-response programs, [U.S. Department of Defense (DOD)] safety programs — so it takes a professional who's a skilled manager, who knows more than the FARs [and who knows] how your airline functions."

U.S. Military Requires Effective Airline Safety Management

In the United States, DOD — the largest customer of the airlines — takes an active interest in the evolution of airline safety structures. More than 6 million members of the U.S. military travel annually on aircraft operated by U.S. air carriers.

Federal law requires DOD to perform an onsite technical safety evaluation (survey) of any commercial air carrier providing or seeking to provide passenger charter airlift services for the military services. These evaluations must be performed before

DOD signs a U.S. Air Force Air Mobility Command contract or U.S. Army Military Traffic Management Command military air transportation agreement for these services, on a biennial basis and when otherwise required to validate adherence to DOD quality and safety requirements.

The DOD Commercial Airlift Review Board (CARB) is authorized to approve, warn, impose temporary nonuse or suspension, and reinstate commercial air carriers in the DOD Air Transportation Program.[24] Because passengers who travel on official orders have no choice in their airline selection, the CARB works to ensure that the commercial airlines and cargo airlines that DOD uses meet or exceed the DOD commercial air carrier quality and safety requirements.

Federal law specifies various quality and safety requirements used to evaluate all air carriers participating in the program. Among these requirements, DOD requires air carriers to establish policies that promote flight safety. Thus, DOD expects air carriers to create a safety culture and to manage safety programs effectively.

The DOD Air Carrier Survey and Analysis Office provides information that enables air carriers to prepare for the evaluation process and works with air carriers before and after a survey. As of July 1999, 124 air carriers were approved for DOD use. Since 1987, 75 air carriers have been denied DOD business at some time because they failed to satisfy DOD quality requirements and safety requirements. Nevertheless, most of these carriers later met the requirements and participated in the DOD program.

DOD also makes available a model flight safety program for adaptation by commercial air carriers that conduct flights for the military services. The model program includes indicators that give DOD insight into an airline's safety culture — such as the level of senior management involvement in safety issues; collection, analysis and dissemination of safety data (including internal audits); effective communication with flight crews that encourages disclosure of errors; and continuous risk assessment. The DOD does not mandate a specific safety program, but provides this model for air carriers to consider when developing their flight safety programs.

An airline's flight safety culture begins with senior leadership and is embedded in all airline personnel using processes that focus on safety. DOD has found that many airlines have created safety cultures that include a climate in which employees can freely participate in discussion of safety-related incidents and can communicate their safety concerns without fear of sanctions. A spirit of cooperation and sharing of safety information among air carriers and U.S. federal agencies has encouraged this flight safety culture at airlines.

Nearly 200,000 members of the U.S. military also travel as passengers on non-U.S. airlines every year. The proliferation of code-share arrangements between U.S. airlines and non-U.S. airlines has added complexity to DOD's evaluation of airline safety programs.

In January 1999, DOD joined in a partnership with seven major U.S. airlines that have code-sharing arrangements with non-U.S. airlines to develop a process for reviewing the safety programs of the non-U.S. airlines.

The resulting DOD-industry working group wrote a memorandum of understanding that will result in the U.S. airlines increasing their evaluations of existing and proposed international code-share partners, and more interaction among code-share partners regarding their safety programs.

Safety-officer Positions Take Root Internationally

Outside the United States, recognition of a need to focus management responsibility for airline safety also has occurred among international aviation organizations.

For example, the International Civil Aviation Organization (ICAO) refers to a DOS-like position in its training manual.[25] The ICAO training manual said: "Annex 6 Part 1 [Chapter] 3 requires that an operator establish and maintain an accident prevention and flight-safety program. Therefore, accident prevention and flight safety activities require an accident-prevention adviser [APA] as a focal point and driving force. The APA should aim to create an awareness and understanding of accident prevention throughout the organization."

The manual said that the APA "should not have an executive role, but should report to the CEO of an airline." There are no APA qualifications listed in the manual, however.

The International Air Transport Association (IATA) relies on regular communication with airlines to encourage a strong safety culture, but does not have a specific policy or advisories about a DOS.[26]

Specific DOS requirements by other civil aviation authorities (CAAs) were not found.

Canadian aviation authorities defined a safety-officer position in regulations in 1987 and 1995, and also required a formal safety structure for large airlines. The regulation was not applicable to commuter operators and air taxi operators.

There were no previous Canadian Aviation Regulations (CARs) mandating that air carriers have a formal safety program.

Judy Rutherford, director of safety services for Transport Canada (TC), said that Canada's large air carriers already had developed DOS-type positions prior to the requirement.[27]

"[Air carriers] realized the value of such a program," said Rutherford. "A tragic accident took place in 1989 that would

forever change the requirement for safety programs in Canadian aviation." (On March 10, 1989, an Air Ontario Fokker F28 struck terrain after takeoff from Dryden, Ontario, Canada.[28])

Rutherford said, "As a result of this accident, the Canadian government established a commission of inquiry into the crash. ... The four-volume final report[29] included 191 aviation-safety recommendations, two of which were very instrumental in the development of the flight-safety program.

"One recommendation was to require air carriers to appoint a properly qualified flight safety officer for the carrier, and to give this person direct access to the CEO on any safety matter. The second one recommended that Transport Canada consult with air carriers and the Transportation Safety Board of Canada to have carriers institute, staff and operate on a continuing basis an effective flight-safety program."

In April 1991, TC created the System Safety Directorate with the following purpose: "To support Transport Canada's mission by identifying, analyzing and communicating information on hazards and risks, and by providing safety advice and safety services to Transport Canada and the aviation community."[30]

In October 1996, new CARs required all operators under Part VII, *Commercial Air Services*, Subpart 5, *Airline Operations*, to have a flight-safety program — CARs 705.07(2)(c) — that conforms to TC's commercial air-service standards — CARs 725.3.

CARs 705.01 said that airline operations are defined in the following manner: "This subpart applies in respect of the operation by a Canadian air operator, in an air transport service or in aerial work involving sightseeing operations, of any of the following aircraft: (a) an airplane, other than an airplane authorized to operate under [subparagraph] 4.4, that has a [maximum certified takeoff weight] of more than 8,618 kilograms (19,000 pounds) or for which a Canadian type certificate has been issued, authorizing the transport of 20 or more passengers; (b) a helicopter that has a seating configuration, excluding pilot seats, of 20 or more; or (c) any aircraft that is authorized by the minister to be operated under this subpart."

Excluded from the requirements for a formal safety structure and flight-safety officer are carriers operating under CARs 703, *Air Taxi Operations*, and CARs 704, *Commuter Operations*.

Nevertheless, Paul Marquis, editor of TC's *Aviation Safety Newsletter*, said that many of these operators have formal safety structures and a DOS-type position without a regulatory requirement.[31]

Marquis said, "These programs are not necessarily formalized in the operations manual. Still, many of these operators have safety meetings from time to time, post company bulletins about safety, [have] open communication between operating personnel and management, [and have] open discussion of problems experienced in day-to-day operations. Most importantly, there is management's insistence on safe operating practices."

Marquis said that safety-program benefits included lower maintenance costs, lower insurance rates, less down time for aircraft, more productive pilots, continued good reputation with clients and increased motivation and positive attitude of employees.

"Transport Canada promotes the benefits of having a company safety program to air-taxi-operator management and [reviews the need for a] requirement for air taxi operators to have a company safety program," said Marquis.

Major airlines in Canada follow the requirements in CARs 705.07(2)(c) about a flight safety program meeting the commercial air service standards, including CARs 725.07(3), which requires a "flight safety person" and establishes the following qualifications for this position in CARs 725.07 (3)(b): "1. (i) extensive operational experience, normally achieved as a flight-deck crewmember or equivalent experience in aviation management; and 1. (ii) training in accordance with paragraph (d) of this standard." CARs 725.07(3)(c) defines the responsibilities of the flight-safety person and CARs 725.07(3)(d) defines the training required for an individual to become a flight-safety person.[32]

Rutherford said that insufficient time has elapsed to determine if these requirements have had a significant effect on aviation safety in Canada, since the regulations affect carriers that already had active voluntary programs.

"The air-taxi [operators] and commuter operators would stand the greatest chance of benefiting from being included in this regulation, and our current efforts are focused on obtaining voluntary participation [in] this program from that important sector of the industry," she said.

With these regulations, TC internally has created a "consultative relationship" between the System Safety Directorate and the regulatory and compliance branches of the agency. Safety personnel function at a distance from the enforcement personnel.

Special emphasis has been placed on support by TC of individual company-safety officers. An example is the TC publication titled *Company Aviation Safety Officer's Training Manual*. Containing essential elements similar to FAA's AC 120-59, *Air Carrier Internal Evaluation Programs*, the TC manual provides detailed information about many other aspects of the safety-officer position, including a model profile of a safety-officer candidate.

In summary, there is wide agreement that the requirement for a DOS in the United States — and a similar position in Canada

— has yielded direct safety benefits and indirect safety benefits. The primary direct benefit has been a cultural shift within some airlines away from dispersed responsibilities and isolated activities to more integrated planning, execution and monitoring of safety-related activities. Such activities often must encompass occupational-safety issues and environmental protection while ensuring the safety of flight operations.

Many indirect benefits have been generated because the dialogue about the DOS position has pushed the industry beyond simple answers, reaching into safety cultures and the critical relationships among airlines, pilots and regulators. FAA's creation of the DOS requirement prompted efforts within the industry to answer some open questions. This exchange of viewpoints and information — represented, for example, by the ALPA-ATA-RAA AC for the DOS position — might lead to solutions greater than the sum of the parts contributed by individual organizations.♦

About the Author

Les Blattner, president of AVCOMM (Aviation Communications), is an aviation author, freelance editor and consultant. A former U.S. Air Force pilot, he has been a consultant and a frequent contributor to publications of the Air Line Pilots Association, International, and served as a domestic policy adviser on aviation in the administration of U.S. President Jimmy Carter. Blattner has a bachelor's degree in journalism from the University of Missouri, U.S.

Notes and References

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2. O'Brien, John. Interview with Blattner, Les. Chevy Chase, Maryland, U.S., May 4, 1999.

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4. U.S. National Transportation Safety Board. *Commuter Airline Safety Study*. NTSB Report No. SS-94-02, Nov. 15, 1994, 72.

5. The Aviation Safety Summit was conducted by the U.S. Department of Transportation, Federal Aviation Administration (FAA), in Washington, D.C., U.S., in January 1995; the FAA Aviation Safety Initiative Review was conducted in New Orleans, Louisiana, U.S., in December 1995.

6. FAA. *Aviation Safety Plan*. Feb. 8, 1996, 48.

7. The White House Commission on Aviation Safety and Security issued a report in September 1997 recommending a national goal of reducing the aviation fatal accident rate by 80 percent within 10 years; changing from 2012 to 2005 the completion date for a revised National Airspace System modernization plan; and treating aviation security as a national security issue and providing substantial funding for capital improvements.

8. The National Civil Aviation Review Commission (NCARC), established by the U.S. Congress, issued one report on funding civil aviation programs and another report on aviation safety in December 1997. NCARC said that many tactical efforts to improve safety were used in the past, but that a comprehensive strategy was needed involving cooperation and collaboration by government and industry.

9. Safer Skies — A Focused Agenda, introduced in April 1998, is a priority safety agenda for government and industry jointly to achieve in 10 years a fivefold reduction in fatal aircraft accidents by spotlighting the leading causes of accidents or incidents in three areas: commercial airlines, general aviation and cabin safety.

10. The author found no references to director of safety (DOS) and similar position descriptions in U.S. Federal Aviation Regulations Part 121 or Part 135 prior to 1995 or corresponding parts of the earlier U.S. Civil Aviation Regulations.

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12. Hall, Jim. Interview with Blattner, Les. Chevy Chase, Maryland, May 27, 1999.

13. Francis, Robert. Interview with Blattner, Les. Chevy Chase, Maryland, May 20, 1999.

14. Goglia, John. Interview with Blattner, Les. Chevy Chase, Maryland, May 28, 1999.

15. Davis.

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17. Bozin, Bill. Interview with Blattner, Les. Chevy Chase, Maryland, June 3, 1999.

18. Prest, Al. Interview with Blattner, Les. Chevy Chase, Maryland, June 23, 1999.

19. Coleman, Walter. Interview with Blattner, Les. Chevy Chase, Maryland, April 13, 1999.

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22. Marshal, Ken. Interview with Blattner, Les. Chevy Chase, Maryland, May 19, 1999.

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24. The authority of the U.S. Department of Defense (DOD) Commercial Airlift Review Board (CARB) is specified in U.S. Public Law 99-661, 32 Code of Federal Regulations Part 861, "Department of Defense Commercial Air Carrier Quality and Safety Review Program," and DOD Directive 4500.53, "Commercial Passenger Airlift Management and Quality Control." Capt. Richelle Dowdell and Dave Patterson, Office of Public Affairs, of the U.S. Air Force Air Mobility Command at Scott Air Force Base, Illinois, U.S., provided the information for this section of the article.

25. International Civil Aviation Organization (ICAO). Annex 6, Part 1, Chapter 3, General. ICAO. *Accident Prevention Manual*. Document 9422.

26. Capt. Ashok Poduval, director, flight operations and safety services, International Air Transport Association (IATA) said that IATA has not recommended specifically a director of safety position.

27. Rutherford, Judy. Interview with Blattner, Les. Chevy Chase, Maryland, July 5, 1999.

28. The *Final Report* of the Commission of Inquiry into the Air Ontario Crash at Dryden, Ontario (Canada) in 1992 said that Air Ontario Flight 1363, a Fokker F28 Mark1000, struck terrain after takeoff from Dryden Municipal Airport on March 10, 1989. Twenty-one passengers and three crewmembers were killed; the aircraft received extensive physical damage and fire damage. The report said, "During the takeoff ... the wings of the aircraft were contaminated [with wet snow] to a critical level, resulting in the degradation of the aircraft's aerodynamic performance by reducing its lifting capability and increasing the drag on the aircraft to the extent that, as the aircraft climbed out of ground effect, the performance loss caused the aircraft to descend and crash."

29. Commission of Inquiry Into the Air Ontario Crash at Dryden, Ontario [Canada]. *Final Report*. Minister of Supply and Services Canada, No. CP 32-55/1-1992E, 1992.

30. Transport Canada. *Company Aviation Safety Officer's Training Manual*, 1995, 3.

31. Marquis, Paul. Interview with Blattner, Les. Chevy Chase, Maryland, July 7, 1999.

32. Canadian Aviation Regulations (CARs) 725.07(3)(c) said, "[The flight-safety person] shall have direct access to the operations manager in flight-safety matters and shall be responsible for managing the flight-safety program by: (i) monitoring and advising on all air-operator flight-safety activities which may have an impact on flight safety; (ii) establishing a reporting system which provides for a timely and free flow of flight-safety-related information; (iii) conducting safety surveys; (iv) soliciting and processing flight-safety improvement suggestions; (v) developing and maintaining a safety-awareness program; (vi) monitoring industry flight-safety concerns which may have an impact on air operator operations; (vii) maintaining close liaison with airplane manufacturers; (viii) maintaining close liaison with Transport Canada–Civil Aviation Safety Directorate and the Transportation Safety Board of Canada; (ix) maintaining close liaison with industry safety associations; (x) developing and maintaining the air-operator accident-response plan; (xi) identifying flight-safety deficiencies and making suggestions for corrective action; (xii) investigating and reporting on incidents/accidents and making recommendations to preclude a recurrence; (xiii) developing and maintaining a flight-safety database to monitor and analyze trends; (xiv) making recommendations to the air operator senior management on matters pertaining to flight safety; and, (xv) monitoring the response and measuring the results of flight-safety initiatives. CARs 725.07(3)(d) said, "[The flight safety person] shall successfully complete a training course that shall include the following subjects: (i) flight safety philosophy; (ii) human factors and the decision-making process; (iii) accident prevention; (iv) the role of the flight-safety officer as adviser to senior management; (v) risk management; (vi) accident/incident management; (vii) the aviation-safety survey; (vii) emergency-response plan; and, incident investigation."

Australia Records 10 Accidents, No Fatalities Among Air-transport Airplanes in 1999, Preliminary Data Show

Information compiled by the Bureau of Air Safety Investigation also shows no fatal accidents in 1998 in air-transport category airplanes.

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FSF Editorial Staff

Ten accidents occurred involving air-transport category airplanes in Australia in 1999, but none was fatal, the Australian Bureau of Air Safety Investigation (BASI) said.

Preliminary 1999 statistics compiled by BASI showed that there were seven accidents involving high-capacity air-transport airplanes and three accidents involving low-capacity air-transport airplanes.

The information also showed that charter airplanes were involved in three fatal accidents and 19 non-fatal accidents in 1999. A total of 10 people were killed in the three fatal accidents, BASI said. Business-category airplanes were involved in six accidents: Four accidents were nonfatal; the other two involved one fatality each.

The 1999 statistics did not include fatality rates or total hours flown.

More complete — but still preliminary — statistics for 1998 showed that one accident occurred involving a high-capacity air-transport category airplane. Another 1998 accident involved a low-capacity air-transport airplane, BASI said. No one was killed in either accident, BASI said in a report, "Australian Civil Aircraft Accidents 1989–1998."

Australian Civil Aviation Regulations define a "high-capacity" aircraft as an aircraft that is certified as having a maximum seating capacity of more than 38 seats or a maximum payload of more than 4,200 kilograms (9,259 pounds). A "low-capacity" aircraft is defined as one that is other than high capacity.

The report placed the 1998 accident rate in the high-capacity air-transport category at 0.14 per 100,000 flight hours. The highest accident rate recorded in the 10-year period was 0.83 per 100,000 flight hours in 1989.

There were no fatal accidents among airplanes in the high-capacity air-transport category during the 10-year period, and the last year that BASI reported more than two accidents in the high-capacity air-transport category was 1989, when three accidents were reported. High-capacity air-transport airplanes were flown 714,800 hours in 1998, compared with 729,200 flight hours in 1997.

BASI listed two fatal accidents (with a total of nine people killed) involving aircraft in the low-capacity air-transport category during the 10-year period. For 1998, the accident rate in the low-capacity air-transport category was 0.37 accidents per 100,000 flight hours. Low-capacity air-transport aircraft

were flown 273,200 hours in 1998, compared with 272,400 hours the previous year. Year-by-year statistics for 1989–98 show that the largest number of accidents involving low-capacity air-transport airplanes was six, recorded in 1992. No accidents were recorded in 1989, when the category was known as "supplementary airline/commuter," and no accidents were recorded in 1997.

Forty-one accidents were reported in the "charter" category in 1998. That number included two fatal accidents in which a total of seven people were killed. The highest number of accidents recorded in the charter category during the 10-year period was 49, recorded in 1994 and again in 1997; the lowest number was 32, in 1991.

The 1998 accident rate for charter airplanes was 8.24 accidents per 100,000 flight hours, compared with 10.07 per 100,000 flight hours in 1997. Charter airplanes were flown 497,500 hours in 1998, compared with 486,700 flight hours in 1997.

Under BASI's definition, the charter category includes aircraft used to carry passengers or cargo for hire or reward in operations "other than carriage in accordance with fixed schedules to and from fixed terminals."♦

Table 1
Australian Civil Aircraft Accidents, 1989–1998

Aircraft Category	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
High Capacity — Air Transport	3	2	2	2	1	2	1	1	0	1
Low Capacity — Air Transport	—	—	4	6	5	4	4	2	0	1
Supplementary Airline/Commuter	0	7	—	—	—	—	—	—	—	—
Charter	43	39	32	37	44	49	42	34	49	41
Agricultural	45	38	25	28	24	16	29	33	34	35
Flying Training	38	33	30	25	36	28	36	26	38	24
Other Aerial Work	31	43	35	32	35	27	19	27	34	16
Private/Business	93	116	137	111	117	86	90	83	74	91
Total General Aviation	250	276	259	233	256	206	216	203	229	207

Note: In 1991, the term "low capacity air transport" replaced the terms "supplementary airline" and "commuter." Statistics prepared before 1991 treated such operations as sectors of general aviation, which does not include air transport operations.

Source: Bureau of Air Safety Investigation, Australia

Table 2
Australian Civil Aircraft Fatal Accidents, 1989–1998

Aircraft Category	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
High Capacity — Air Transport	0	0	0	0	0	0	0	0	0	0
Low Capacity — Air Transport	—	—	0	0	1	0	1	0	0	0
Supplementary Airline/Commuter	0	0	—	—	—	—	—	—	—	—
Charter	5	5	2	2	4	6	3	6	4	2
Agricultural	6	2	1	3	1	4	2	4	5	2
Flying Training	3	4	3	1	0	2	1	0	0	1
Other Aerial Work	3	9	1	1	3	4	4	4	1	2
Private/Business	7	10	14	18	14	9	12	9	7	16
Total General Aviation	24	30	21	25	22	25	22	23	17	23

Note: In 1991, the term "low capacity air transport" replaced the terms "supplementary airline" and "commuter." Statistics prepared before 1991 treated such operations as sectors of general aviation, which does not include air transport operations.

Source: Bureau of Air Safety Investigation, Australia

Table 3
Australian Civil Aircraft Fatalities, 1989–1998

Aircraft Category	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
High Capacity — Air Transport	0	0	0	0	0	0	0	0	0	0
Low Capacity — Air Transport	—	—	0	0	7	0	2	0	0	0
Supplementary Airline/Commuter	0	0	—	—	—	—	—	—	—	—
Charter	16	18	3	2	8	22	8	13	8	7
Agricultural	6	2	2	3	1	4	2	4	5	2
Flying Training	7	6	4	2	0	4	1	0	0	1
Other Aerial Work	7	14	1	1	4	5	6	5	3	3
Private/Business	10	24	35	41	33	16	20	21	12	33
Total General Aviation	46	64	45	49	46	51	37	43	28	46

Note: In 1991, the term “low capacity air transport” replaced the terms “supplementary airline” and “commuter.” Statistics prepared before 1991 treated such operations as sectors of general aviation, which does not include air transport operations.

Source: Bureau of Air Safety Investigation, Australia

Table 4
Australian Civil Aircraft Hours Flown (in Thousands), 1989–1998

Aircraft Category	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
High Capacity — Air Transport	361.5	412.9	483.5	526.8	561.7	613.2	667.0	711.1	729.2	714.8
Low Capacity — Air Transport	—	—	212.8	223.4	227.7	238.3	243.1	246.2	272.4	273.2
Supplementary Airline/Commuter	195.4	204.3	—	—	—	—	—	—	—	—
Charter	462.2	402.7	387.5	407.0	396.5	427.2	468.8	483.3	486.7	497.5
Agricultural	159.0	161.1	110.2	89.6	97.9	86.9	103.2	125.6	136.9	147.5
Flying Training	451.1	486.4	458.4	427.5	442.7	424.9	436.5	450.4	455.3	484.1
Other Aerial Work	309.3	302.2	290.0	264.0	286.1	308.4	309.7	292.5	314.6	319.3
Private/Business	546.8	576.7	502.9	462.7	480.7	458.2	443.2	447.3	445.7	429.7
Total General Aviation	2123.8	2133.4	1749.0	1650.8	1703.9	1705.6	1761.4	1799.1	1839.2	1878.1

Note: In 1991, the term “low capacity air transport” replaced the terms “supplementary airline” and “commuter.” Statistics prepared before 1991 treated such operations as sectors of general aviation, which does not include air transport operations.

Source: Bureau of Air Safety Investigation, Australia

Table 5
Australian Civil Aircraft Accident Rate Per 100,000 Hours, 1989–1998

Aircraft Category	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
High Capacity — Air Transport	0.83	0.48	0.41	0.38	0.18	0.33	0.15	0.14	0.00	0.14
Low Capacity — Air Transport	—	—	1.88	2.69	2.20	1.68	1.65	0.81	0.00	0.37
Supplementary Airline/Commuter	0.00	3.43	—	—	—	—	—	—	—	—
Charter	9.30	9.68	8.26	9.09	11.10	11.47	8.96	7.03	10.07	8.24
Agricultural	28.30	23.59	22.69	31.24	24.50	18.41	28.10	26.28	24.83	23.73
Flying Training	8.42	6.78	6.54	5.85	8.13	6.32	8.25	5.77	8.35	4.96
Other Aerial Work	10.02	14.23	12.07	12.12	12.23	8.75	6.13	9.23	10.80	5.01
Private/Business	17.01	20.11	27.24	24.01	24.34	18.77	20.31	18.56	16.60	21.18
Total General Aviation	11.77	12.93	14.81	14.11	15.02	12.07	12.26	11.28	12.45	11.02

Note: In 1991, the term “low capacity air transport” replaced the terms “supplementary airline” and “commuter.” Statistics prepared before 1991 treated such operations as sectors of general aviation, which does not include air transport operations.

Source: Bureau of Air Safety Investigation, Australia

Publications Received at FSF Jerry Lederer Aviation Safety Library

FAA Issues Guidelines for Airframe Ice-protection Systems

Advisory circular supplements previously published guidance concerning ice-protection systems for other parts of transport category airplanes.

FSF Editorial Staff

Advisory Circulars

Certification of Transport Category Airplanes for Flight in Icing Conditions. U.S. Federal Aviation Administration Advisory Circular (AC) 25.1419-1. Aug. 18, 1999. 21 pp. Available through GPO.*

This AC provides guidance for certification of airframe ice-protection systems on transport category airplanes. The AC also contains guidance that supplements guidance in other ACs concerning icing requirements for other parts of the airplanes, including engines, engine inlets and propellers. [Adapted from AC.]

Instructions for Continued Airworthiness. U.S. Federal Aviation Administration Advisory Circular (AC) 33.4-1. Aug. 27, 1999. 14 pp. Available through GPO.*

This AC provides information and guidance on acceptable methods of compliance with U.S. Federal Aviation Regulations Part 33.4, the requirements for preparing instructions for continued airworthiness of aircraft engines. [Adapted from AC.]

Airworthiness and Operational Approval of Digital Flight Data Recorder Systems. U.S. Federal Aviation Administration Advisory Circular (AC) 20-141. Oct. 5, 1999. 18 pp. Available through GPO.*

This AC provides guidance on design, installation and continued airworthiness of digital flight data recorder systems. The method outlined complies with U.S. Federal Aviation Regulations Parts 23, 25, 27, 29, 91, 121, 125, 129 and 135. [Adapted from AC.]

Certification of Transport Airplane Structure. U.S. Federal Aviation Administration (FAA) Advisory Circular (AC) 25-21. Sept. 1, 1999. 1,504 pp. Available through GPO.*

This AC provides acceptable methods for showing compliance with the provisions of subparts C and D of U.S. Federal Aviation Regulations Part 25 regarding the type-certification requirements for transport airplane structure. The guidance is intended for airplane manufacturers, modifiers, foreign regulatory authorities and FAA transport airplane type certification engineers and their designees. [Adapted from AC.]

Reports

Organizational Change: Effects of Fairness Perceptions on Cynicism. Thompson, Richard C.; Bailey, Lawrence L.; Joseph, Kurt M.; Worley, Jody; Williams, Clara A. U.S. Federal Aviation Administration (FAA) Office of Aviation Medicine. Report DOT/FAA/AM-99/27. November 1999. 12 pp. Available through NTIS.**

Keywords:
1. Fairness
2. Cynicism
3. Organizational Climate
4. Job Satisfaction
5. Organizational Trust

Recent research on workforce cynicism generally has examined specific organizational settings such as police departments. This study investigates workforce cynicism within a division of a large federal agency. One hundred twenty employees (14 management employees and 106 non-management employees) of the FAA Office of Aviation Medicine voluntarily completed an organizational survey.

The study used two measures of cynicism (cynicism about change and coworker cynicism), five measures of fairness (awards fairness, awards-system fairness, work-distribution fairness, work-level fairness and supervisory fairness) and four workplace characteristics (episodic stress, role overload, organizational trust and job satisfaction). Results demonstrated that employee cynicism is related to perceptions of fairness in the workplace. Organizational trust was the strongest overall predictor of both cynicism about change and coworker cynicism. [Adapted from Introduction, Method and Discussion.]

Controller Teamwork Evaluation and Assessment Methodology: A Scenario Calibration Study. Bailey, Larry L.; Broach, Dana M.; Thompson, Richard C.; Enos, Robert J. U.S. Federal Aviation Administration (FAA) Office of Aviation Medicine. Report DOT/FAA/AM-99/24. October 1999. 21 pp. Available through NTIS.**

Keywords:
1. Air Traffic Control
2. Training
3. Teamwork

Although air traffic control (ATC) specialists must interact with others to ensure the safe flow of air traffic, they receive little formal training in crew coordination. They are selected, trained and evaluated primarily for competence. For the purpose of this study, a low-cost, ATC multisector team-training platform was developed to simulate radar-based ATC tasks. Three scenarios were designed to place the participants under a predefined (low, medium and high) amount of work based on the average number of aircraft presented over time. Under each scenario, results showed that, as the number of aircraft increased, there were statistically significant increases in aircraft delay times and safety errors and a decrease in the percentage of aircraft reaching their destinations. As the scenarios became more difficult, the participants' perceptions were that their workloads were increasing. Experience with a given scenario led to an improvement in teamwork. [Adapted from Introduction and Conclusions.]

Organizational Communication and Trust in the Context of Technology Change. Worley, Jody A.; Bailey, Lawrence L.; Thompson, Richard C.; Joseph, Kurt M.; Williams, Clara A.. U.S. Federal Aviation Administration (FAA) Office of Aviation Medicine. Report DOT/FAA/AM-99/25. October 1999. 12 pp. Available through NTIS.**

Keywords:
1. Communication
2. Organizational Trust
3. Technology Change
4. Organizational Change

During times of modernization and other organizational changes, effective communication and the free exchange of information are key elements. Factors that might impede communication can undermine the planned changes. Perception is an element often overlooked at the organizational level. This study examined the relationship between perceptions of organizational trust and communication, as well as other organizational variables within the context of significant technological change in a division of a large federal agency. Results indicate that significant predictors for open communication are organizational trust, supervisory leadership style, workgroup cohesion and acceptance of change. If concerns related to open communication and organizational trust are neglected, particularly when change is occurring, chances of an otherwise smooth transition may be undermined. [Adapted from Introduction and Conclusions.]

Books

Performance of Light Aircraft. Lowry, John T. Reston, Virginia, U.S.: American Institute of Aeronautics and Astronautics, 1999. 475 pp.

This book introduces pilots, aviation students and aviation enthusiasts to quantitative methods for predicting the performance of small fixed-wing aircraft. Some of the techniques described have been outlined previously only in research journals. The author uses his mathematically oriented method to answer practical and realistic performance questions. The method is explained and applied to maneuvering flight, partial-throttle operations, and takeoffs and landings. The first six chapters discuss the Fundamentals of Aeronautic Science; the remainder of the book covers Practical Airplane Performance. Contains an index. [Adapted from preface and back cover.]

Human Factors in Multi-crew Flight Operations. Orlady, Harry W.; Orlady, Linda M. Brookfield, Vermont, U.S.: Ashgate Publishing Co., 1999. 623 pp.

This book describes a broad approach to human factors in aviation and the relationship between human factors and the safety and efficiency of air transport operations. The application of modern knowledge of human factors and the impact of new technology are discussed from an industry perspective intended for readers who are active in current air transport operations, as well as for students. The book details the background of the industry and addresses all aspects of air transport human factors, including aviation problems, safety and the future of the industry. Contains a glossary and an index. [Adapted from inside front cover.]

Emergent Commercial Trends and Aviation Safety. Abeyratne, Ruwantissa I.R. Brookfield, Vermont, U.S.: Ashgate Publishing Co., 1999. 353 pp.

Factors that may compromise civil aviation safety are discussed in this book, along with an analysis of the regulatory process formulated to address safety by the International Civil Aviation Organization (ICAO) and several regional civil aviation organizations: African Civil Aviation Commission, European Civil Aviation Conference and Latin American Civil Aviation Commission. Part I presents the history of commercial aviation and current commercial trends. Part II explores challenges faced by the international community in ensuring aviation safety. Part III draws general conclusions about issues discussed in the book. Contains an index and an index of cases cited. [Adapted from preface.]

Airliners of the World. Wilson, Stewart. Fyshwick, Australia: Aerospace Publications, 1999. 176 pp.

This directory consists of international commercial passenger aircraft from 1914 through mid-1999. With 300 entries, the directory provides information about all major and minor airliners and prototypes that never were developed. Entries are arranged alphabetically by manufacturer with the aircraft listed chronologically. A brief history is presented for each aircraft, along with specifications, performance data and production data. Contains an index. [Adapted from Introduction.]

General Aviation Firefighting for Structural Firefighters. Tackett, William R. Albany, New York, U.S.: Delmar Publishers, 1999. 214 pp.

This book was written for the typical firefighter who primarily fights structural fires and who has little or no experience with general aviation aircraft or the airports used by these aircraft. Basic training materials are provided to teach firefighters how to respond safely to an incident involving general aviation aircraft. Illustrations explain the airport environment, establishment of communication links, components of general aviation aircraft, coordination with other agencies and the types of incidents that involve general aviation airports and aircraft. Contains a glossary and an index. [Adapted from preface and back cover.]♦

Sources

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Updated U.S. Federal Aviation Administration (FAA) Regulations and Reference Materials

Advisory Circulars (ACs)

AC Number	Date	Title
150/5300-14	Aug. 13, 1999	*Change 1 to Design of Aircraft Deicing Facilities.*
60-25C	Aug. 23, 1999	*Reference Materials and Subject Matter Knowledge Codes for Airman Knowledge Testing.* (Cancels AC 60-25B, *Reference Materials and Subject Matter Knowledge Codes for Airman Knowledge Testing,* dated April 21, 1998).
90-91D	Aug. 23, 1999	*North American Route Program (NRP).* (Cancels AC 90-91C, *National Route Program,* dated Nov. 23, 1998).
150/5340-1H	Aug. 31, 1999	*Standards for Airport Markings.* (Cancels AC 150/5340-1G, *Standards for Airport Markings,* dated Sept. 27, 1993).
61-65D	Sept. 20, 1999	*Certification: Pilots and Flight and Ground Instructors.* (Cancels AC 61-65C, *Certification: Pilots and Flight Instructors,* dated Feb. 11, 1991).

International Reference Updates

Airclaims

Supplement Number	Date	
116	Sept. 7, 1999	Updates "World Aircraft Accident Summary."
116	Sept. 28, 1999	Updates "Major Loss Record."

Flames in Overhead Luggage Bin Prompt Extra Training for Flight Attendants on In-flight Fire Fighting

Pilots Continue Flight to Intended Destination After Blaze Is Extinguished

FSF Editorial Staff

The following information provides an awareness of problems through which such occurrences may be prevented in the future. Accident/incident briefs are based on preliminary information from government agencies, aviation organizations, press information and other sources. This information may not be entirely accurate.

Passenger's Help Needed to Discharge Fire Extinguishers

Airbus A340-313. Minor damage. No injuries.

Nine hours into a night flight from England to South Africa, the airplane was being flown over Zambia when a passenger told two flight attendants working in the rear galley that there was a fire in the cabin. The flight attendants saw light from an area above a central overhead luggage bin, and one flight attendant picked up a Halon fire extinguisher while the other used the flight interphone system to notify the pilots.

The flight attendant with the fire extinguisher saw smoke and flames through a narrow gap between the top of the luggage bin and the ceiling, and she attempted to discharge the extinguisher into the bin but could not break the seal on the extinguisher. A passenger then discharged that extinguisher, as well as a second extinguisher, into the bin and extinguished the fire. The bin was opened, and more extinguishers were used to ensure that the burned material would not re-ignite.

The cause of the fire was not immediately apparent, and the contents of the luggage bin were placed into plastic bags to be given to authorities for investigation. After the captain was told that the fire was out and the cabin was safe, he decided to continue the flight to the intended destination.

After the incident, cabin crewmembers were given additional briefings. No recommendations were made, "given the successful outcome of what constituted a serious emergency," the report said.

The report by the U.K. Air Accidents Investigation Branch said that, in their training on how to respond to in-flight fires, flight attendants did not break the seals on fire extinguishers because of an agreement between the airline and the training firm that recognized the environmental damage caused by the discharge of Halon. Instead, flight attendants practiced with water-filled extinguishers that were easier to discharge and they were given briefings on what to expect in a real fire.

Rain Blamed for Airplane's Off-runway Landing

Boeing 757. Substantial damage. 40 minor injuries.

The airplane was being landed at an airport in Spain during a rainstorm just before midnight when it skidded off the runway and into an adjacent field. The aircraft broke into three sections during the accident, which resulted in minor injuries for about 40 of the more than 239 passengers and crew.

Airport officials said that the rain and the wet runway contributed to the accident.

Investigators Seek Cause of Fire in Auxiliary Power Unit

Antonov An-124-100. Minor damage. No injuries.

Ground crewmembers at an airport in England turned on the left auxiliary power unit (APU) to supply electrical power to two internal 10-ton (9.1-metric-ton) gantry cranes that were used to load cargo. The cranes normally are powered by a ground power unit (GPU), but the GPU was not producing enough electrical current. The aircraft's APU is rated for the task. During the start cycle, the APU's exhaust-gas temperature gauge showed a rapid increase in temperature, and a crewmember canceled the start cycle to prevent the temperature from exceeding the maximum allowable value. As the start cycle was being canceled, the APU's exhaust emitted flames that damaged aerodynamic fairings above the exhaust system.

After the midday incident, the APU start-cycle control unit and the fuel-manifold valves were tested and were found to be working properly. The APU, which had been operated for 90 hours since overhaul and was covered by a warranty, was returned for investigation and repair. Russian authorities said that the incident was a result of the failure of the main starting manifold valve; an investigation was ordered to determine the reason for the failure.

Pilot Blames Deteriorating Weather for Runway Excursion

Boeing 737-200. Substantial damage. No injuries.

Night instrument meteorological conditions prevailed as the airplane was flown on an instrument approach to an airport in Cuba. When the airplane was eight miles from the airport, the captain told air traffic control that he had the runway in sight.

During the landing roll on Runway 5, the airplane departed the runway. None of the 63 passengers and six crewmembers was injured, but the airplane was substantially damaged. Winds were reported from 240 degrees at 25 knots with gusts to 30 knots. Visibility was reported as one-quarter mile (403 meters) in thunderstorms.

The captain said that "after landing … with 15,000 pounds of fuel, we found bad weather conditions, which caused a total loss of visibility, resulting in a loss of directional control, which at the same time caused the aircraft to exit the right side of the runway."

Pilots Use Asymmetric Engine Power to Return Airplane to Wings-level Attitude

Boeing 707-320. No damage. No injuries.

The airplane had just departed from an airport in Uruguay and was being flown in visual meteorological conditions when the flight crew conducted a left turn at an altitude of about 2,000 feet. After the turn was complete, the pilots could not roll the airplane's wings level. The pilots used asymmetric engine power to return to a wings-level attitude and to fly the airplane back to the airport for landing. The landing, just before sunset, was uneventful.

Investigation Probes Uncommanded Yaw

Boeing 737-247. No damage. No injuries.

The airplane was on a mid-morning flight in visual meteorological conditions to an airport in the United States when the crew experienced what was described by the airline as a "two-second uncommanded yaw to the right." Following the incident, the airplane was flown to its destination without additional problems. After the crew conducted an uneventful landing, the flight data recorder and the power control unit were removed from the aircraft for examination. The airplane was not damaged, and none of the 110 people on board was injured.

Rudder Pedals Collapse Under Pilot's Feet

Embraer EMB-120ER. No damage. No injuries.

The flight crew was completing pre-taxi flight-control checks at an airport in Australia when the captain's rudder pedals collapsed downward, out of reach of the pilot's feet. The pilot used the pedal-position adjuster to move the pedals back into position, and the rudder pedals then operated properly.

Maintenance technicians could not determine what caused the problem, but the operator said that pilots of other company airplanes had experienced two similar incidents. The operator informed the manufacturer of a discrepancy in the maintenance manual's instructions on lubricating the rudder-pedal linkage and spindle assembly. The manufacturer then issued a service bulletin recommending that grease be removed from the underfloor bellcrank spindle assembly and that the assembly be re-lubricated.

Cracked Windshield Ply Prompts Investigation

Canadair Regional Jet. Minor damage. No injuries.

The aircraft was climbing through 20,000 feet on a late morning flight from England to Northern Ireland when the center glass ply on the right main windshield cracked. The inner ply and outer ply remained intact, and aircraft pressurization was not affected.

The pilot leveled the airplane, and the first officer declared a PAN-PAN (the international radio-telephony urgency signal, when repeated three times, indicates uncertainty or alert followed by the nature of the urgency) and requested vectors to an airport in England, where the pilots executed a normal landing.

The operator has reported three failures of windshield center plies in less than one year, and at least 18 operators have experienced similar problems since 1994 involving center plies and outer plies on windshields and side windows, the report said. The failures were thought to be results of incorrectly applied tape, which left the glass seam exposed; of drill work during manufacturing; or of disbonds and voids within the laminated screen. After those problems were addressed, the windshield plies continued to crack but at a reduced rate.

The aircraft manufacturer and the windshield manufacturer have investigated and found no correlation between the windshield ply failures and "specific operators, time of year, geography, window position or aircraft age." The windshield manufacturer also has conducted pressure testing and has determined that, even with a broken windshield ply, the windshield remains in place and does not leak when cabin pressure is increased to nearly twice the maximum pressure differential allowed on the aircraft. Further tests were planned.

Chip Failure Cripples Electronic Navigation Equipment

Fokker F28. Minor damage. No injuries.

While in cruise during a flight from the Netherlands to Scotland, crewmembers smelled a strong odor of "electrical burning." They also observed that the right primary flight display (PFD) was fluctuating and was changing to a non-standard format. As precautions, the first officer turned off his PFD, his navigation display (ND) and his flight management computer (FMC), and both pilots donned oxygen masks and turned off recirculation fans.

The captain transmitted a PAN-PAN (the international radio-telephony urgency signal, when repeated three times, indicates uncertainty or alert followed by the nature of the urgency) requesting an immediate descent and a diversion to land at an airport in England, then took control of the aircraft from the first officer. During the next few minutes, several level 2 alerts occurred concerning FMC navigation, all map information was lost on the remaining FD, and the flight director failed. The crew configured the airplane for a surveillance radar approach in case of total navigation-systems failure. The landing was normal.

Maintenance technicians replaced the right PFD, and the system then functioned properly. The PFD was returned to the manufacturer, and a subsequent inspection revealed a faulty random-access memory chip. The cause of the failure was not determined.

Accident Prompts Change in Requirements for Line-training Captains

Saab SF-340A. Minor damage. No injuries.

The first officer, who was on his second day of line training, was flying an early afternoon auto-coupled instrument landing system approach to an airport in England under the supervision of a newly appointed line-training captain. The first officer disconnected the autopilot when the airplane was stable, correctly aligned with the runway and at an altitude between 200 feet and 300 feet. The first officer said that, as he continued the descent, between 100 feet and 150 feet, the airplane began to drift away from the centerline and to "balloon upwards." As the airplane was flown across the runway threshold, it floated above the runway "for some considerable distance" before the captain took control.

"Almost immediately, the aircraft landed heavily on the main landing gear and pitched forward, causing the nosewheel to impact with the runway," said the report by the U.K. Air Accidents Investigation Branch.

After the impact, the captain noticed a vibration that caused him to believe that the nose landing gear tires had burst, so he applied gentle braking, turned the airplane off the runway and brought it to a stop. An inspection revealed that the rims on both nosewheels disintegrated during the landing, that the wheels were worn down to the hubs and that debris from the wheel rims damaged one propeller blade and a conduit for hydraulic lines. A subsequent inspection of the main wheels showed cracking around the drive keys.

The operator's operations manual set a maximum flight duty period of 10 hours and 45 minutes for days on which pilots' duties began between 6 a.m. and 7:59 a.m. and said that the standard reporting time should be one hour prior to flight. In this instance, the crew arrived at the airport at 5 a.m., one hour before the scheduled reporting time, because the line-training captain — who was in his third day in that position — wanted extra time to brief the first officer. On his two prior days on the job, the line-training captain had imposed a similar starting time that was one hour before the required reporting time, and the first day, he had extended the post-flight briefing for one hour beyond the end of the recorded duty period.

As a result of the accident, the operator changed training procedures to require a safety pilot to occupy the jump seat during the initial phase of line training. The operator also adopted more stringent requirements for selection of line-training captains and for training.

Pilot Loses Eyeglasses During Visual Examination of Landing Gear

Cessna 210. Substantial damage. No injuries.

Before executing a night landing at an airport in the United States, the pilot observed an unsafe-landing-gear indication. The pilot leaned out the window to visually inspect the landing gear, and her eyeglasses were blown from her face. After flying to a larger airport that was better equipped to assist a pilot making a gear-up landing, she landed the airplane. The main landing gear collapsed, and the airplane skidded, turned 180 degrees on the runway and came to rest with its weight on the horizontal stabilizer. The airplane received substantial damage, but the pilot was not injured.

An inspection of the airplane revealed a crack in the right-main-landing-gear actuator and incorrect operation of the power-pack-sequencing valve. Accident investigators said that the probable cause of the accident was a six-inch to eight-inch (15.2-centimeter to 20.3-centimeter) crack on the right-main-landing-gear strut, which allowed hydraulic fluid to leak from the system. The failure of the power-pack-sequencing valve allowed the main landing gear to fold when the airplane landed. The report said the pilot's execution of a night landing without her eyeglasses was a factor in the accident.

Battery Leak Detected After Airplane's Loss of Electrical Power

Learjet 55B. Substantial damage. No injuries.

The flight crew reported the loss of all electrical systems during a mid-morning flight in visual meteorological conditions to an airport in the United States, and they were unable to extend the landing gear. The subsequent gear-up landing resulted in substantial damage to the airplane, but the five passengers and two pilots were not injured.

A preliminary inspection revealed that the no. 1 battery was leaking through a crack in the battery case.

Carbon Monoxide Poisoning Cited in Off-airport Landing

Piper Comanche. Substantial damage. One minor injury.

The pilot flew the airplane to 5,500 feet, trimmed the airplane for cruise and set the global positioning system receiver for a direct flight to an airport in the United States. The pilot said that he remembered setting his radios for arrival but could not recall anything else until he "awoke" in a field, believing that he was still airborne. The report said that the airplane had touched down in a wings-level attitude and had traveled about 525 feet (184 meters) before it struck a fence and some trees and came to a halt.

The pilot was taken to a hospital, where blood tests showed 26.8 percent saturation with carbon monoxide.

Inspection of the airplane revealed a crack around one of the seams in the right muffler. The crack allowed exhaust fumes into the cabin, the report said. The airplane recently had undergone an annual inspection, and the pilot made the flight before the final paperwork was signed.

Gear Collapses During Landing Roll on Unimproved Runway

Pilatus PC-6. Substantial damage. No injuries.

The pilot was delivering an airplane to a new airport in the United States. He had been driven to the airport to inspect

the runways before the flight. On his approach for the inaugural landing at the new airport, the pilot maneuvered the airplane to land on the east side of the new runway, and the airplane touched down on an unimproved portion of the runway.

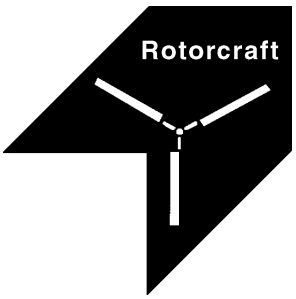
During the landing roll, as the airplane was traveling about 25 knots, the right wheel hit a depression, and the right main landing gear collapsed. The severity of the damage "was found not to be compatible with the physical evidence found at the accident site," and an investigator said that the landing gear's failure was not a direct result of hitting the "soft dirt at low speed." Aircraft records gave no indication of a previous accident or damage that could have led to the landing gear failure, and the reason for the failure could not be verified, the report said.

Airplane Strikes Terrain During Approach in Freezing Rain

Piper Aztec. Airplane destroyed. One serious injury; one minor injury.

Instrument meteorological conditions prevailed during the first leg of a ferry flight to deliver the airplane from the United States to an airport in Israel. No flight plan was filed.

The airplane was being flown on an instrument landing system approach to an airport in Canada when the airplane pitched downward and entered a bank. The airplane struck trees and terrain about one mile (1.6 kilometers) short of the runway shortly before sunset. Visibility at the time was reported as one mile, with overcast clouds at 100 feet, light freezing rain, light ice pellets and fog. Wind was from 110 degrees at 17 knots with gusts to 28 knots.



Lightning Strike Damages Rotor Head, Blades

Aerospatiale AS332L2. Substantial damage. No injuries.

The crew was flying the helicopter in day visual meteorological conditions from an airport in Scotland to an oil field when the helicopter entered a light snow shower. The pilots proceeded "with no concern that they were at risk of being struck by lightning when the helicopter suddenly suffered a strike," the report said. The helicopter appeared to handle normally, the pilots said. They requested a descent to return to the airport, where they conducted a normal landing.

The helicopter's global positioning system navigation receiver was unserviceable after the lightning strike, and a subsequent inspection determined that all four main-rotor blades and the main-rotor head had been damaged by lightning; all were ordered replaced.

Helicopter Rolls During Logging Operation

Bell 206. Helicopter destroyed. One injury.

The helicopter was being maneuvered above a hillside on a logging operation in Canada when the chokers attached to the end of the external-load long line caught on a large log. The helicopter reached extreme pitch attitudes before the chokers released, and the line then snagged another log. The pilot lost control of the helicopter, and, while the helicopter was attached to the ground by the line and external load, the helicopter struck the ground, rolled over and began to burn.

Ground crews used a helicopter fire extinguisher to extinguish the blaze, but a second fire broke out and consumed the aircraft. The pilot received serious injuries. He was wearing a helmet, which bore evidence of extensive impact damage and which was credited with preventing more serious injuries.

Preliminary information revealed no mechanical failure on the helicopter before the accident.

Loose Screw Restricts Flight Controls

Sikorsky S-76A. No damage. No injuries.

The pilot reduced the helicopter's airspeed to prepare for landing gear extension near the end of a morning flight and then discovered that the cyclic could not be moved aft and that, when he moved the cyclic stick forward, the stick then could not be moved aft of the new position. After the pilot maintained a constant cyclic longitudinal position and stabilized the helicopter in a level pitch attitude, he used lateral cyclic movements to land the helicopter on the runway at an airport in Australia.

An inspection found a screw lodged at the base of the cyclic stick in a position that caused the cyclic restriction. The screw probably was introduced into the area during previous maintenance, the report said.

As a result of the incident, the operator ordered its fleet of S-76 helicopters to undergo inspections of the area around the base of the cyclic stick. The manufacturer, citing this incident and a similar incident involving another Australian operator in 1995, conducted a design engineering review of the cyclic stick base hardware and then said that modifications were planned to avoid similar incidents.♦

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