Who Is Flying The Aircraft?

Captains decided to put first officers at the controls during severe weather in several air carrier accidents. The author takes a thought-provoking look at that practice.

by

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From January 1983 to June 1987 the U.S. National Transportation Safety Board (NTSB) aviation accident data system reports 30 airline accidents/incidents in which the first officer was the pilot flying the aircraft.

Three accidents resulted in fatalities: DC-8, three fatalities, Detroit, Michigan, November 1983; DC-9, one fatality, two minor injuries, Sioux Falls, South Dakota, December 1983; and L-1011, 135 fatalities, multiple severe and minor injuries, Dallas/Ft. Worth, Texas, August 1985. There were nine accidents where severe or minor injuries occurred without any fatalities.

Three accidents that do not appear in the NTSB summary should be included because the first officers were flying the aircraft: B-737, Washington, D.C., fatal to 74 on board and six on the ground, January 1982; B-727, New Orleans, Louisiana, fatal to 145 on board and eight on the ground, July 1982; and DC-9, 27 fatalities, Denver, Colorado, November 1987. These three accidents, along with the L-1011 in the NTSB summary, have something in common. They occurred in unusual weather conditions.

The total number of "first officer flying" accidents may constitute only a small percentage of all the accidents/incidents reported by the NTSB. However, the catastrophic results of these four occurrences suggest an examination of corporate aviation practices, as well as airline policies and philosophies, regarding the exchange of pilot flying and pilot not flying duties.

NASA Report

U.S. National Aeronautics and Space Administration (NASA) Report No. CR166433, "Flight Crew Performance When Pilot Flying and Pilot Not Flying Duties are Exchanged," reviews Aviation Safety Reporting System (ASRS) reports and operational anomalies — unwanted occurrences but less serious than accidents. While the NASA report says there are no quantitative data, it makes the supposition that first officers are performing flying duties at least 40 percent to 45 percent of the time on scheduled airline flights.

Flying and non-flying duties may be exchanged, but U.S. Federal Aviation Regulation 91.3 (a) is explicit in defining captain or pilot-in-command responsibility. "The pilot-in-command," the FAR says, "is directly responsible for and is the final authority as to the operation of the aircraft."

That responsibility cannot be transferred. It requires, among other implied duties, compliance with U.S. Federal Aviation Administration (FAA) and company rules and regulations; a review and confirmation that all aspects of flight planning are correct; performance of subordinate crew members be monitored, and instruction and training provided as appropriate; command authority to be exercised in routine or emergency situations; and responsibility for the "operational image" conveyed to passengers and crew.

In regard to flight crew performance failures, the NASA report says:

"At least two individual performance failures are involved in each operational anomaly. The first is usually, but not always, the responsibility of the pilot flying. Most often, it consists of a failure to keep the airplane on its desired flight path at its desired speed and configuration. The second failure is a failure of flight crew monitoring and is usually, but not always, the responsibility of the pilot not flying.

"It consists of either a failure to detect the departure from expected performance in time to prevent the unwanted occurrence, a failure to communicate the departure in a timely or effective manner, or a failure to take effective action if an appropriate response is not received from a clearly adequate and timely monitoring communication."

Corporate Operations

Practices differ between corporate aircraft and airline operations.

When passengers are on board during corporate aircraft operations, the practice of exchanging pilot duties between a qualified captain and a first officer, who has not been checked out or type rated in the aircraft, appears to be relatively rare. Stated company policies tend to be very specific and frequently set a minimum number of hours to be flown in the aircraft before consideration will be given to upgrading a pilot to captain or allowing the first officer to be at the controls when passengers are on board.

When two qualified captains are crewing the aircraft, pilot-in-command authority may be exchanged by flight leg or on a daily or mission basis. In those cases, the designated pilot-in-command never relinquishes that responsibility, regardless of the seat occupied.

There is another aspect of corporate aircraft operations bearing on cockpit management. The crew complement is not subject to many changes. Crews fly together with great regularity, and this stability fosters certain advantages over a period of time. The pilots have a greater awareness of each other's proficiency, personality traits, management styles, and how each may react under stress. On the other hand, it can encourage complacency.

Airline Operations

Most airlines employ union pilots. Those who do not may have a system for pilots to bid for routes with priority based upon seniority. Crews are usually composed of strangers who may or may not get to know one another before bidding for the next trip sequence takes them in different directions. It is unusual for two captains, other than for training or flight checks, to be assigned to the same crew.

Hiring, training and upgrading policies vary between airlines. The flow of highly trained and disciplined military pilots into the airlines has been reduced significantly during the past several years. New hires are less likely to possess high flight time on sophisticated equipment, which places a burden on the initial training demands required to occupy the first officer's seat. In addition, the carrier/passenger growth generated by deregulation in the U.S. has been reflected in the lower pilot experience levels of most airlines.

The "Carrot"

As far as a first officer's psyche goes, the carrot on the end of the stick is the chance to prove one's mettle by being allowed to fly the aircraft on alternate legs. Besides boosting ego, manipulating the controls offers the opportunity to gain experience, to get to know the airplane, and to learn what it can, or cannot, do. That experience is a valuable cockpit asset and makes a future checkout as pilot-in-command an easier task. Few pilots aspire to be permanent first officers, content and happy with the ritual of monitoring the captain.

If NASA's assumption is correct, that first officers are performing pilot duties 40 percent of the time, another question is raised. Is alternating legs between pilots an inviolable or unassailable right, regardless of circumstances?

Should the privilege be denied, based upon the severity of weather conditions, the peculiarities or complexities of an airport or airspace environment, or any other factors that, after more than casual analysis, suggest that the most experienced pilot on board should be the one at the controls of the aircraft? Given all the circumstances of a marginal operation, which pilot would the passengers elect if they were allowed to vote and express their preferences?

The following accident reviews are drawn from NTSB documents.

B-737, Washington, D.C.

On January 13, 1982, a B-737 collided with a bridge one minute and 15 seconds after takeoff from Washington National Airport at Washington, D.C. The NTSB determined that the probable cause was the flight crew's failure to use engine anti-ice during ground operations, its decision to takeoff with snow/ice on the airfoil surfaces, and the captain's failure to reject the takeoff during its early stage when his attention was concentrated on anomalous engine instrument readings. A contributing factor was the limited experience of the flight crew in winter jet transport operations.

The captain, 34, had approximately 8,300 flight hours, 2,300 of them acquired with the air carrier as a DC-9 first officer (471 hours), B-737 first officer (752 hours) and B-737 captain (1,100 hours).

He was described by other pilots as a quiet person with good operational skills and knowledge. During a line check about 19 months prior to the accident, he was found to be unsatisfactory in the following areas:

- Adherence to regulations.
- Checklist use.
- Flight procedures, such as departures and cruise control, approaches and landings.

As a result, his initial line check qualification as a B-737 captain was suspended. Three months later, he received a satisfactory grade on a line check and was granted authority to act as pilot-in-command. About eight months prior to the accident, the captain received an unsatisfactory grade on a recurrent proficiency check when he showed deficiencies in

memory items, knowledge of aircraft systems and aircraft limitations. Three days later, he took another check and passed.

The first officer had flown two takeoffs or landings where precipitation and freezing conditions occurred during his employment with the air carrier.

The first officer, 31, had approximately 3,353 flight hours, 992 of them accumulated flying the B-737 for the airline. Prior to his employment, he had been a fighter pilot in the U.S. Air Force. Friends described him as witty, bright and outgoing, with an excellent command of the physical and mental skills required of a pilot. Those who flew with him said he "knew his limitations." Several said he would not hesitate to speak up if he knew that something specific was wrong with a flight operation.

The NTSB found that the captain, after upgrading to the left seat on the B-737, had flown eight takeoffs or landings where precipitation and freezing conditions occurred. The first officer had flown two takeoffs or landings in similar conditions during his employment with the air carrier.

The captain and first officer had flown together as a crew for 17 1/2 hours.

Flight crews with this air carrier routinely reverse duties on alternate legs of flight. The captain, however, remains in the left seat. On the accident flight, the first officer was making the takeoff. There were no written procedures in the air carrier's operations manual that specified the reversal of duties between the captain and the first officer, but procedures were standardized during training. The captain controls the aircraft until it is aligned with the runway centerline. The first officer sets the engine thrust levers to the target EPR value.

When the aircraft is aligned with the runway, the first officer assumes directional control of the aircraft, using rudder pedal steering. During the takeoff acceleration, the first officer normally would be looking outside to maintain directional control, with a scan to the air speed indicator. The captain's attention would be directed to checking engine instruments and monitoring flight instructions. Even with the reversal of duties, the captain was solely responsible for a final decision to reject a takeoff.

On the accident flight, there were problems with the pushback, as well as fuselage and wing deicing. After the pretakeoff checklist was completed, the first officer asked, "Slush (sic) runway, do you want me to do anything special for this or just go for it?"

The captain responded, "Unless you got anything special you'd like to do."

The first officer replied, "Unless just take off the nose wheel early like a softfield takeoff or something. I'll take the nose wheel off, and then we'll let it fly off."

The weather observation about takeoff time was: ceiling indefinite 200 feet obscured; visibility one-half mile; moderate snow; temperature and dewpoint both at -4 degrees C (24 degrees F).

The first officer expressed concern with instrument readings: "God, look at that thing." "That's not right." "Naw, I don't think that's right."

The flight was cleared for takeoff with a controller's request for no delay: "Traffic's two and half out for the runway." During the takeoff, the first officer expressed concern with instrument readings on several occasions: "God, look at that thing." "That don't seem right, does it?" "That's not right." "Naw, I don't think that that's right." "I don't know."

Approximately 75 seconds after engine spool up, the aircraft was unable to maintain altitude and struck the bridge spanning the Potomac River.

Since the captain was the non-flying officer during the takeoff, the NTSB report said he should have been the most attentive to the engine instruments and most observant of any anomalies. Instead, it was the first officer who continually expressed concern. The captain apparently ignored the first officer's comments and continued to allow the takeoff.

The NTSB concluded that there was sufficient doubt concerning instrument readings early in the takeoff roll to cause the captain to reject the takeoff while the aircraft was still at relatively low air speed. It also noted that the doubt was clearly expressed by the first officer and that the failure of the captain to respond and reject the takeoff was a direct cause of the accident.

Comment

This condensation of a NTSB accident report does not cover all of the circumstances, but seeks to focus upon the inter-relationship of crew assignments and duties. Given the circumstances, should the captain have been the pilot flying? Would that have impacted his decision not to abort the takeoff?

As the non-flying pilot charged with monitoring the instruments, would the first officer have expressed greater concern over the engine instruments and been assertive to the extent that he would have called for a rejected takeoff? Since neither pilot had extensive flying experience in icing weather conditions, should either, or both, have been more

concerned about ice accretion, deicing procedures and engine instrument readings?

B-727, New Orleans, Louisiana

On July 9, 1982, a B-727 began its takeoff from runway 10 at New Orleans International Airport. There were rain showers over the east end of the airport that extended along the aircraft's intended takeoff path. Winds were gusty, variable and swirling.

The B-727 lifted off the runway, climbed to between 95 feet and 150 feet above the ground, and then began to descend. It struck a line of trees 2,376 feet beyond the departure end of the runway at an altitude of approximately 50 feet above the ground. It continued on an eastward track for another 2,234 feet hitting houses and trees, and crashed in a residential area about 4,610 feet from the end of the runway.

The NTSB determined that the probable cause of the accident was the aircraft's encounter during the liftoff and initial climb phase of flight with a microburst-induced wind shear. It imposed a downdraft and a decreasing headwind, the effects of which the pilot would have had difficulty recognizing and reacting to in time for the descent to be arrested, before the B-727's impact with trees.

The first officer was the pilot flying. The NTSB drew no conclusions from this, but its report does state that "the captain is responsible for evaluating the severity of the weather, and, based on this appraisal, he is responsible for choosing the most appropriate course of action." It adds that "the captain's decision to takeoff was reasonable in light of the information that was available to him."

The airline's flight operations manual states that, when thunderstorm activity is approaching within 15 miles of the airport, the captain has, among other considerations, the option of delaying takeoff or landing. Supervisory personnel said this option is based upon the captain's evaluation of the aircraft's performance capability, runway conditions, wind and weather.

The company's director of flight standards testified that captains ". . . routinely do not take off in bad weather and delay and cancel flights." There was no evidence that management exerted any pressure on its flight crews to keep to schedules in disregard of weather or other safety considerations.

The captain had flown 11,727 hours, 10,595 of them in the B-727. Other pilots, training personnel and supervisors reported that the captain was considered to be an above-average pilot and that his judgement and ability to exercise command were rated excellent. He had been commended for his handling of an inflight emergency involving a complete loss of AC electrical power and a subsequent emergency landing.

The first officer had flown 6,127 hours, 3,914 of them in the B-727. Peers, company training personnel and line captains, who had flown with him, said he was considered to be a conscientious pilot with an excellent knowledge of the airplane's systems and company flight procedures and techniques. They described him as being quiet, but he could always be counted on to supply information when it was needed.

The airline's flight operations manual gives the captain the option to delay takeoff or landing when thunderstorm activity is within 15 miles of the airport.

According to the aircraft's cockpit voice recorder (CVR), the flight crew had completed its takeoff and departure briefings before turning onto the active runway for takeoff. While the aircraft was taxiing to runway 10, ground control advised another flight crew of low-level wind shear alerts in the northeast quadrants of the airport and provided the relevant wind directions and speeds. This advisory was received on the accident aircraft's radio.

The first officer requested another wind check. Ground control replied, "Wind now zero seven zero degrees at one seven, peak gusts two three, and we have low-level wind shear alerts all quadrants, appears to be a frontal (sic) passing overhead right now, we're right in the middle of everything."

The captain then advised the first officer to ". . . let your air speed build up on takeoff. . . ." and said that they would turn off the air conditioning packs for takeoff, which would enable them to increase the EPRs on engines 1 and 3.

While the flight crew was completing the final items on the takeoff checklist, the local controller cleared a flight to land on Runway 10 and advised ". . . wind zero seven zero at one seven. Heavy Boeing just landing said a 10 knot wind shear at about a hundred feet on the final." The CVR showed that this advisory also was received on the accident aircraft's radio. The aircraft began its takeoff and the CVR showed that callouts were made. Company personnel familiar with the voices of the flight crew identified the captain as the person making those callouts.

As the takeoff progressed, the captain said, "Come on back, you're sinking, Don. Come on back." Then the ground proximity warning system (GPWS) activated, and "whoop, whoop, pull up, whoop . . . ." was recorded on the CVR.

The captain had flown a wind shear training exercise during simulator training three years before the accident.

There was no record that the first officer had received "hands-on" wind shear training in the simulator.

Both pilots had been with another airline that had merged with the one for whom they were flying at the time. The previous airline had a slide/tape presentation called "Hostile Environment" in its annual ground training program. It presented wind shear data and wind shear effects on aircraft performance, and recommended pilot techniques to counter wind shear effects. According to training records, the captain had flown a wind shear training exercise during recurrent simulator training approximately three years before the accident. There was no requirement for the first officer to receive "hands-on" wind shear training in the simulator; there was no record that he had done so.

Their current employer conducted simulator training in a manner similar to the previous airline, that essentially involved a 180-degree change in wind direction over a six-second period, while the magnitude of the wind was at the discretion of the check airman. Since the maneuver was not a graded item and no entries were made in the airman's training folder to denote that he had accomplished the maneuver, training personnel could not determine whether either the captain or first officer had performed this maneuver during their last recurrent simulator training periods.

In analyzing the pilot's performance during the accident, the NTSB noted that the aircraft had entered heavy rain by the time of liftoff, or immediately afterwards, making the pilot totally dependent on his instruments to detect and react to the wind shear.

The aircraft climbed for approximately 11 seconds, after which the pitch attitude decreased from 13 degrees to five degrees, and a descending flight path developed. The pilot reacted to the descent, and a nose-up pitching moment was developed within six seconds of the descent, but the descent could not be arrested before impact with the trees.

The NTSB concluded that the pilot's action to correct the aircraft's nose-down pitching moment and descending flight path at least equalled the response that could be expected under the prevailing conditions.

Comment

While there can be little argument with NTSB's findings as to the primary cause of the accident, questions can be raised. Why was the first officer flying the aircraft and making a takeoff into what was a severe weather condition? Even though the captain's wind shear training was somewhat limited, there was evidence that some training had been accomplished. On the other hand, there were no records to indicate that the first officer had received any "hands-on" wind shear training. Given the severity of the weather at the precise time of takeoff, would the outcome have been changed had the captain been the pilot flying?

L-1011, Dallas/Fort Worth, Texas

On August 2, 1985, an L-1011, crashed during an approach to land on runway 17L at Dallas/Fort Worth International Airport. While passing through a rain shaft beneath a thunderstorm, the flight entered a microburst, which the pilot was unable to traverse successfully. The L-1011 struck the ground about 6,300 feet north of the approach end of Runway 17L, hit a car on a highway, struck two water tanks on the airport property, and broke apart. Of the 163 persons on board, 134 passengers and crew members were fatally injured.

The NTSB determined that the probable causes of the accident were the flight approach into a cumulonimbus cloud, that the crew had observed to contain visible lightning; the lack of specific guidelines, procedures and training for avoiding and escaping from low-altitude wind shear; and the lack of definitive real-time wind shear hazard information. This resulted in the aircraft's low-altitude encounter with a microburst-induced severe wind shear from a rapidly developing thunderstorm located on the final approach course.

The first officer was the pilot flying at the time. The flight crew had observed rain showers in the area as the flight proceeded inbound and was switched to approach control. The flight was cleared for an ILS approach and acknowledged. The controller requested the flight "to reduce your speed to one six zero please," and the captain replied, "Be glad to." Approximately one minute later, the controller said, "And, we're getting some variable winds out there due to a shower. . . north end of DFW." This transmission was received and an unidentified flight crew member remarked, "Stuff is moving in."

The airline's procedures manual said to avoid thunderstorm conditions if possible and ". . . below 10,000 ft., avoid (thunderstorm) areas by five miles." The first officer observed lightning in the cumulonimbus cloud before he flew the aircraft into it.

The flight was instructed to slow to 150 KIAS and to contact the DFW airport tower. The captain told the tower, "Out here in the rain, feels good." The tower cleared the flight to land and informed it, "Wind zero nine zero at five, gusts to one five." The first officer called for the before-landing check and said 45 seconds later, "Lightning coming out of that one." The captain asked, "Where?" The first officer replied, "Right ahead of us."

The flight continued descending along the final approach course. The captain called out "1,000 feet" and 14 seconds later he cautioned the first officer to watch his indicated air speed. A sound identified as rain began. Two seconds later, the captain warned the first officer, "You're gonna lose it all of a sudden; there it is." Five seconds later, the captain said, "Push it up, push it way up." The sound of engines at high rpm was heard on the CVR, and the captain said, "That's it."

Eighteen seconds later, the ground proximity warning system's "whoop, whoop, pull up" alert sounded, and the captain commanded "TOGA" (takeoff-go-around-switch, a pilot-actuated switch that, when selected while the airplane is being flown manually, provides flight director command bar guidance for an optimum climbout maneuver). Two additional GPWS alerts were recorded plus a sound similar to that of the takeoff warning horn. The aircraft then struck the ground.

The NTSB was concerned with the flight crew's operational decisions in view of the weather. The board felt that the captain had received sufficient information to appraise the weather along the ILS localizer course to runway 17L. The airline flight operations procedures manual contained company policy regarding thunderstorm avoidance and wind shear. When a flight is to encounter thunderstorm conditions, "detour the area if possible. When early evasive action is not practical . . . . below 10,000 ft., avoid areas by five miles." The manual also states, "If below 500 ft. AGL in shear conditions and glide slope deviation exceeds one dot below or above, missed approach should be initiated."

All three flight crew members were aware of the weather across the final approach course and the NTSB said the decision to continue was the flight crew's.

The NTSB reported that, although it was the captain's responsibility to decide either to continue or discontinue a landing approach, in this particular case it was a flight crew decision. The first and second officers were aware of the weather across the final approach course. One minute elapsed between the time the first officer reported sighting lightning and entry was made into the microburst wind-field.

The first officer, the board felt, had ample time to inform the captain that he believed the approach should be discontinued. Since this suggestion was not made, the NTSB said neither pilot saw any reason to suggest that the approach be discontinued and had concurred with the captain's intent to continue. As a consequence, it said, the flight crew had the responsibility for the decision.

The captain, 57, had flown 29,300 hours, 3,000 of them in the L-1011. According to airmen who had flown with him, he was a capable and meticulous pilot who adhered strictly to company procedures. He explained his thoughts on aircraft operations to the flight crew, and cautiously deviated around thunderstorms, even when other flights took more direct routes. He willingly accepted suggestions from the flight crew and made prompt decisions.

The first officer had flown 6,500 hours, 1,200 of them in the L-1011. Captains, who had flown with him, described him as an above average first officer, adding that he had excellent knowledge of the L-1011. He had worked for two years with the company's ground school instructors' staff to revise the L-1011 pilot operating manual. The FAA had designated him as a line and proficiency check airman in the L-1011.

Comment

Given the experience level of both pilots and the captain's background as a pilot "who adhered strictly to the company procedures," what persuaded the flight crew to continue the approach with the first officer as the pilot flying? Could it be that the captain was unwilling to take command for psychological reasons?

Both were FAA designated line-check airmen in the L-1011. Although the captain had warned the first officer, "you're gonna lose it all of a sudden, there is it," can there be a reason why he did not take over command and fly the aircraft rather than monitor the first officer's actions?

DC-9, Denver, Colorado

On November 15, 1987, a DC-9 crashed on takeoff during a snowstorm at Denver's Stapleton Airport. There were 28 fatalities and 54 survivors. Although the NTSB has not yet issued a final report with its findings, the NTSB investigator's reports were available for examination which allowed for pertinent extracts.

The captain and the first officer met in Denver on the first leg of a three day trip sequence they would crew together. They had never flown together before. It was the captain's third trip sequence as a line captain and the first officer's second trip sequence in that position.

The captain signed the amended dispatch release, and indicated that he was a "high minimums" captain, but did not communicate this to the dispatcher. The company operations manual requires a "high minimums" captain to notify the dispatcher prior to encountering weather which may affect the trip. In this case, the existing weather was below the captain's landing minimums which required incorporation of an alternate in the dispatch release for the flight.

The weather prior to the accident was reported as ceiling indefinite, 500 feet obscured, snow and fog, RVR 1,200 feet. Weather immediately after the accident was ceiling indefinite, 300 feet obscured, visibility 3/8 mile, RVR 600 feet.

There was communication confusion and a delay in time is an important issue because of the freezing temperature, heavy wet snow, and the fact that the older model DC-9 lacked leading edge slats.

There was some confusion as to clearance delivery and tower clearances. NTSB described an unusual sequence of events after the DC-9 left the boarding gate. The aircrew did not request a clearance to taxi to the de-icing pad. As far as the tower controller knew (he could not see the airplane through the snow), the DC-9 was still at the gate. When the aircrew radioed for clearance to make the next movement, controllers cleared the aircraft to proceed to the de-icing pad. The plane, which was already at the pad, taxied to the runway instead. Consequently, controllers were giving takeoff clearances to airplanes behind the DC-9 and at least one flight taxied around the DC-9 to takeoff. Elapsed time could be an important issue because of the temperature, heavy wet snow and the fact that the DC-9 was an older model that lacked slats on the front edge of the wings.

The flight chronology went like this:

At approximately 1414, the captain prompted the first officer to tell the tower that they were in position and said, "he can't see us."

At 1414:22, the captain stated, "Got the brakes on, you got the airplane." This confirmed that the first officer was the pilot flying. The first officer acknowledged, "Okay." The captain then told him to ". . . run 'em up a little before you release the brakes and let them stabilize."

At 1414:31, the tower cleared the flight for takeoff and reported the wind "360 at 14, RVR 2,000 feet."

At 1414:51, engine sounds increased and 15.7 seconds later the captain reported the power set at 95 and 93. At 1415:17, he called out "100 knots." As the nosewheel began making noise, he called "V1" at 1415:28.5, "rotate" at 1415:30.9 and "positive rate" at 1415:36.5. Less than a second later the nosewheel noise stopped.

At 1415:39.5, the sound of a compressor stall was heard, followed by an expletive and several more compressor stalls prior to impact.

The captain received his initial type rating in the DC-9 on April 3, 1987; simulator training on October 30, 1987; and the last recurrent training on October 16, 1987. He had accumulated approximately 12,125 total flying hours, 3,326 of them pilot time: 3,111 hours as first officer in the B-727 and 133 hours as first officer in the DC-9. He had a total DC-9 pilot-in-command time of 33 hours.

The captain began his duties with the airline as a second officer in the Boeing 727 in 1969 and in 1977 he became a first officer until December 1982, when he was returned to second officer status because of furloughs. He was on strike from October 1, 1983 until July 31, 1986, when he returned as a second officer in the B-727.

The carrier's manager of DC-9 programs was involved in the simulator proficiency check of the captain and recalled a very thorough and professional brief, that included use of the engine anti-ice after start and using anti-ice at 800 feet (company procedure). Throughout an hour in simulated icing conditions, the instructor noted that the captain was calm, confident, and performed the maneuvers well.

The first officer's training reports indicated that he had experienced continuing difficulty with his instrument scan and smooth operation of the flight controls, especially pitch.

The first officer was hired by the airline on July 20, 1987, and held an Airline Transport Rating with type ratings for the BE-300 and BE-1900, twin-engine turboprop aircraft. He had accumulated 3,186 flying hours including 36 hours in the DC-9.

He began the airline's normal seven-period simulator training on August 29, 1987. Following the second period the instructor's written comments were, "SCAN! Need to review (procedures) and profiles."

On the third period, he was described as better but "scan still needs work, a little jerky on the flight controls." After period four the instructor commented, "Scan still weak. Pitch control jerky, altitude control when pressure is on is somewhat sloppy. Knowledge (of maneuvers) good."

Comments on the fifth period indicated general improvement. "Scan is better. Still a bit jerky on pitch. . . seems to have caught up on the aircraft today."

His sixth period on September 8 was with a different instructor and the comments were, "Scan is a real problem, completely lost control of aircraft with engine out and at 2,000 feet! Went into 45-60 degree angle of bank, lost 1,500 feet! Had to be arrested by (instructor). Altitude and airspeed control generally way out of limits. Some basic procedures still require review." The unsatisfactory progress in period six necessitated a repeat which was coincidentally accomplished by the same instructor with three hours of training in the available 4-hour block. The instructor did grade the flight "normal progress" but made the following comments:

1. Needs to review limitations and profiles.

2. Falls behind in planning, also not sure of what to do next—may be lack of experience.
3. Scan was a problem during first half of three hour period but improved toward the end.

After period seven, with a third instructor on September 11, the comment was, "Nice job! No problems." He then completed a proficiency check on September 14 with another instructor who graded his performance "average."

On October 2, the first officer began his initial operating experience (I.O.E.) as a line pilot. The check airman commented that his takeoff rotation was somewhat slow and identified descent/arrival planning as needing improvement, but he was satisfied with performance. Following the final trip of the I.O.E., he wrote, "No significant problem areas noted. Excellent attitude, should make a fine employee. Released to line operations."

The NTSB documents state:

"The company is currently evaluating the feasibility of pairing experienced first officers with inexperienced captains, and vice versa, as well as possibly establishing requirements or guidelines for new captains to make all takeoffs and landings. He (the Director of Training) acknowledged that pairing would be very difficult to implement but various arbitrary restrictions to new captains, e.g., captain makes all takeoffs and landings for first 50 landings or first 100 hours, etc., would be easier. He also pointed out that in many respects the most recently trained pilots are best prepared at a given point in time."

Comment

Even without the final NTSB report and knowledge of what it had determined the causal factors for this accident, aspects of it raise questions.

The flight crew had not met until the day of the flight, so that neither person had any knowledge of what the other was like as a pilot. If the captain had seen the training reports on his first officer, would he have permitted him to fly the aircraft considering the weather conditions? Can anything be made out of an airline scheduling practice that pairs two low time DC-9 pilots (or any other transport aircraft) together? With the weather as it was, and the possibility of ice accretion on the aircraft, should the captain's first decision have been whether to go at all? What moved the captain to turn the flying over to the first officer?

Who Should Fly The Aircraft?

This article questions the practices which allow first officers to fly the aircraft during severe weather conditions or when severe weather is forecast. The captain has the pilot-in-command authority, regardless of common practices, and physically flying the aircraft might add another safety factor, however small, to the successful completion of a flight.

At the minimum, the captain, who is monitoring while the first officer is flying, should be prepared to assume control immediately whenever the slightest doubt exists as to the safety of the flight. Calling out instructions or giving advice as a problem progresses should give way to assumption of control. Discussion about that action can be addressed after the flight has been safely completed.

Airlines take the position that their training is adequate and that the pilot who is checked out as captain or first officer is completely qualified to perform in that position. However, the question of who should be flying the aircraft when adverse weather conditions are in the offing seems to demand attention and clarification in company operating procedures.

About the Author

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He served as a command pilot in the U.S. Air Force and the Air National Guard. He retired as a colonel from the U.S. Air Force Reserve after 33 years service.

Reports Received At FSF

CAP 534: *Report of the Committee on Runway Utilisation at Heathrow and Gatwick*. CAA report presented to the Secretary of State for Transport, December 1987 (21pp.). (Report published March 1988 and is available from CAA London)

Summary: This report summarizes the activities and deliberations of a special committee established by the CAA upon request of the Secretary of State, to ". . . examine in the light of the interrelationship between air space management and runway utilisation, what further capacity for aircraft movements could be made available within current environmental constraints at Heathrow and Gatwick beyond what was envisioned in the May 1986 CAA advice to the Secretary of State for Transport on air traffic in the London area (CAP527)."

The committee was given precise terms of reference which did not allow it to make formal recommendations for change that conflict with existing environmental constraints at Heathrow and Gatwick. The committee, after a detailed and critical examination of the technical issues, determined that within the terms of reference, the scope for increasing runway capacities at the two airports is necessarily small.

Nine recommendations were formulated which, if implemented, offer slight gains in additional traffic during peak hours at both Heathrow and Gatwick. The recommendations also addressed the improvement of data collection and communication between the CAA and other government and industry bodies concerned with the airport capacity issue.

NASA TP-2803. *Investigation of the Misfueling of Reciprocating Piston Aircraft Engines*. National Aeronautics and Space Administration, Washington, D.C. 20546 U.S.

Summary: The Aircraft Misfueling Detection Project was developed by the Goddard Space Flight Center/Wallops Flight Facility at Wallops Island, Virginia. Its purpose was to investigate the misfueling of reciprocating piston aircraft engines by the inadvertent introduction of jet fuel in lieu of, or as a contaminant of, aviation gasoline (avgas). The objective was the development of a device that will satisfactorily detect misfueling and provide pilots with sufficient warning to avoid injury, or equipment damage. Two devices have been developed and successfully tested: one, a small contamination detection kit, for use by the pilot, and a second, more sensitive, modified gas chromatograph for use by the fixed-base operator (FBO). The gas chromatograph, in addition to providing excellent quality control of the FBO's fuel handling operation, is a very good back-up for the detection kit in the event it produces positive results. Design parameters were developed that might be easily applied to commercial production by the aircraft industry.

General Aviation Safety Statistics United States, Great Britain and Australia

Although most countries conduct their own general aviation aircraft accident investigations and maintain their own safety records and statistics, only a few countries make their accident statistics systematically available to other countries.

The format and contents of the information released varies significantly because each country defines the term "general aviation" differently. Consequently, general aviation in different countries includes different categories of aircraft operations. Therefore, the following presentation of the United States, Great Britain and Australia general aviation accident statistics is for information only. The data are improper for comparison.

United States

The term "general aviation" in the United States is defined in different ways. The U.S. National Transportation Safety Board (NTSB) defines general aviation as civil aircraft operations other than those conducted under 14 CFR Part 121 and 14 CFR Part 135. What is "14 CFR part 121 or Part 135"? It is too technical to be readily understood by the general public.

The FAA in its annual publication *FAA Statistical Handbook of Aviation* says "general aviation" includes "that portion of civil aviation which encompasses all facets of aviation except air carriers." In practice, general aviation includes personal pleasure and business flying, corporate flying, instructional training flights and industrial applications.

The U.S. government has maintained a relatively complete record of general aviation accident reports and statistics since 1927, although the concept of general aviation in those old days was quite different from what it is now. However, the safety performance of U.S. general aviation in recent years has been very encouraging. The number of accidents and rates set new lows one year after another. There were 2,420 accidents in 1987, 426 of which were fatal accounting

for 788 fatalities. This compares with 4,079 accidents, 661 fatal accidents and 1,276 fatalities in 1977.

Table 1 shows the U.S. general aviation accidents, fatal accidents, fatalities and rates for the last decade. Note that for the fifth year in a row since 1982, the total accident rate and fatal accident rate dropped reaching 8.25 and 1.45 per 100,000 aircraft flight hours respectively. Both are record lows. The 788 fatalities in 1987 are also a record low since NTSB began keeping safety statistics in 1967.

Table 1—Accidents, Fatalities and Rates
U.S. General Aviation*
1977 - 1987

						Accident Rates Per 100,000 hours	
	Accidents		Fatalities		Aircraft	Aircraft Hours	
Year	Total	Fatal	Total	Aboard	Hours Flown#	Total	Fatal
1977	4079	661	276	1265	31,578,000	12.91	2.09
1978	4216	719	1556	1398	34,887,000	12.08	2.06
1979	3818	631	1221	1203	38,641,000	9.88	1.63
1980	3590	618	1239	1230	36,402,000	9.66	1.69
1981	3500	654	1282	1261	36,803,000	9.51	1.78
1982	3233	591	1187	1171	32,095,000	10.06	1.84
1983	3075	555	1064	1057	31,048,000	9.90	1.79
1984	3010	543	1039	1018	31,510,000	9.54	1.72
1985	2741	498	952	941	30,590,000	8.95	1.62
1986	2581	469	955	868	29,318,000	8.80	1.60
1987P	2420	426	788	N/A	29,320,000	8.25	1.45

P Preliminary data.
Source of estimates: FAA
* All operations other than those conducted under 14 CFR 121 or 14 CFR 135.
Note: Suicide and sabotage accidents excluded from rates as follows:
Total - 1977 (1), 1978 (2), 1980 (1), 1982 (3), 1984 (3), 1985 (3)
Fatal - 1977 (1), 1978 (2), 1980 (1), 1984 (2), 1985 (2)

In the United States, personal and business flying averages about 30 percent and 20 percent respectively of total general aviation flying hours. In 1987, personal flying was involved in almost 64 percent of the total accidents and 68 percent of fatal accidents while personal business flying only accounted for 7.8 percent of total accidents and 11.7 percent of fatal accidents. The most significant entry is corporate flying, which averaged about 15 percent of general aviation flying hours, but accounted for less than one percent of total accidents and fatal accidents. This rate could be attributed to the fact that corporate operations are run by professional pilots.

Great Britain

The term “general aviation” as defined by the British Civil Aviation Authority refers to those “commercial, executive, club and group, private and training flying, operating aircraft less than 5,700 kg, other than gliders, microlights, balloons and public transport aircraft.”

In the United States, operations of a DC-9 or a B-737 are categorized, by definition, as general aviation activities if the aircraft are operated by professional pilots for transporting properties or personnel of a corporation. However, similar operations in Great Britain might not be categorized as general aviation operations at all.

During the past ten years, the number of annual general aviation accidents, fatal accidents and rates in Great Britain were very erratic. All those figures went down one year and up the next. There were 205 accidents in 1977, only nine of which were fatal, as compared with 219 accidents and 23 fatal accidents in 1978. It went up in 1979 and down again in 1980 and up again in 1981 and down again in 1982. Fatal accidents increased to 27 in 1987, the highest in the decade.

Table 2 shows the total reportable accidents, fatal accidents and rates for the past ten years. Although the total accident rate dropped from 30 per 100,000 flying hours in 1977 to 20 in 1987, the fatal accident rate showed little improvement.

Table 2 — Great Britain General Aviation
Accidents, Fatal Accident and Rates*

1977 - 1987

Year	Reportable Total	Estimated Fatal	Rate per 100,000 hours Flying Hours(000)	Total	Fatal
1977	205	9	667	30.7	1.3
1978	219	23	679	32.3	3.4
1979	193	18	706	27.4	2.5
1980	208	15	721	28.9	2.1
1981	195	20	711	27.4	2.8
1982	147	11	705	20.9	1.6
1983	189	24	732	25.8	3.3
1984	176	14	766	22.3	1.8
1985	154	16	768	20.1	2.1
1986	-	12	750	-	1.6
1987	-	27	850	-	3.2

* All aircraft less than 5700 kg, excluding microlight, gliders, balloons and aircraft for public transport

Source: CAA

Australia

In Australia, general aviation includes “all flying by civil aircraft other than airline aircraft and gliders.” In practice, general aviation includes private business, agriculture, flight training, charter and other aerial operations.

Note that on-demand air taxi operations is a portion of general aviation. From 1983 to 1986, the number of accidents in Australia general aviation fell from 263 to 209.

During the five years prior to 1983, the annual fatal accident average had been 22. It fell to 19 in 1984, 17 in 1985 and went up to 19 in 1986. Table 3 shows Australian general aviation accidents and fatal accidents by category of aircraft.

Table 3 —Australia General General Aviation
Total Accidents and Fatal Accidents
by Category of Aircraft

	1979-1983 (Average) Aircraft Accidents				1984 Rate/100,000 Accidents			
	Total	Fatal	Flying Hours Total	Fatal	Total	Fatal	Rate /100,000 Total	Fatal
Fixed Wing								
Single Engine	174	15	16.2	1.40	153	13	15.2	1.29
Multi-engine	37	5	7.1	1.05	37	5	6.8	0.92
Rotary Wing	31	2	26.3	1.52	30	1	19.9	0.66
Glider	122	12	29.1	2.9	19	4	22.5	4.73

	1985 Accidents		1986 Accidents	
	Total	Fatal	Total	Fatal
Fixed Wing				
Single Engine	136	10	148	12
Multi-engine	39	2	26	4
Rotary Wing	36	5	35	3
Glider	9	1	22	2

Source: Bureau of Air Safety Investigation, Australia

Accident/Incident Briefs

A.C.

Bad Bump

Australia - May 15

Boeing-747: No damage. Various injuries to 24 of 172.

The jumbo jet was five hours out of Sydney on a flight from San Francisco when it flew into turbulence and threw several passengers to the ceiling and then onto seats and aisles. Most of the passengers had been asleep prior to the incident.

After landing at Sydney, 21 passengers were taken to hospitals with bruises but all were released the same day.

After minor repairs to the cabin, the airplane was returned to service.

737 On Grass

United States- No date

Boeing-737: No damage. No injuries to 41.

The airliner was flying through an intense thunderstorm that produced hailstones up to three inches in diameter on approach to New Orleans International Airport.

Suddenly, the pilot called the control tower to report that he had lost power on both engines and that he had to make an immediate emergency landing. A controller directed him to a nearby general aviation airport but the pilot said he would not be able to reach it and would land in the first available place. He landed in a grassy field between a drainage canal and a levee at a Martin Marietta aerospace complex, choosing the grass over a concrete runway at the facility. All 36 passengers and five crewmembers deplaned without injury and there was no apparent damage to the aircraft, except for the nose where the paint had been removed, indicating hail damage.

Investigators initially considered whether the double engine failure could have been caused by the hail and driving rain or possibly by contaminated fuel. There was enough fuel left in the tanks for the flight to have been completed to its intended destination. The flight had originated at San Salvador and had made a stop at Belize.

Warning Light On Takeoff

United States - May 22

DC-10: Substantial damage. Injuries to 19 of 254.

The fully loaded aircraft was on takeoff roll at Dallas-Fort Worth International Airport bound for Frankfurt when a warning light indicated insufficient lift for a successful takeoff.

The captain elected to abort the takeoff, and during the runout the airplane ran off the end of the runway. The DC-10 rolled about 1,000 feet through mud and grass and the nose gear collapsed. It stopped on its nose and the occupants left via inflatable escape chutes. Three crew members suffered back injuries and were taken to a hospital, along with four passengers who were later released. Approximately 12 passengers were injured slightly and were treated at the airport. The aircraft had structural damage to the nose and possible engine damage.

Coffee, Anyone?

Costa Rica - May 24

Boeing-727: Aircraft destroyed. Minor injuries to two of 28.

The aircraft, with 20 passengers and a crew of eight, had just lifted off from the San Jose airport bound for Miami. It climbed about 20 feet before it settled back down and crashed into a coffee field about 650 feet beyond the end of the runway. One wing separated and burned, and the aircraft broke into four parts as it hit a wall bordering the main highway. The passengers left through the escape exits; injuries were limited to one broken ankle and one less serious injury.

Accident/incident briefs are based upon preliminary information from government agencies, aviation organizations, press information and other sources. The information may not be accurate.

A preliminary investigation indicated that possible lack of power in one of the engines could have been a causal factor.

Birds, Birds, Birds

United Kingdom - June 28

BAC-111: Minor damage. No injuries.

During the takeoff roll on a flight from Newcastle International Airport to Minorca, the aircraft ran into a flock of birds and lost power. The pilot aborted the takeoff and the aircraft overshot the runway during roll-out. The occupants escaped unhurt, some using escape chutes to deplane. The airplane received damage to the engines as a result of bird ingestion.

Hot Tires

United States - June 30

DC-8: Damage to landing gear. No injuries to five.

The pilot of the cargo jet approaching Seattle-Tacoma International Airport en route from Dayton reported hydraulic problems. During the landing, controllers saw the right main gear tires begin to smoke before they burst into flames. The aircraft stopped on the runway and fire equipment, stationed there in response to the trouble report, extinguished the fire quickly. Four tires on the right main gear were blown out; there were no injuries to the five crewmembers aboard the airplane.

A.T/C

Bit By Beta

United States - March 4, 1987

Casa 212: Aircraft destroyed. Fatal injuries to nine. Ten survived.

The final report by the National Transportation Safety Board (NTSB) cited the inability of the pilot to recover from an asymmetrical thrust condition for the landing accident at Detroit Metro Airport. When less than 100 feet above the runway, the wings rolled left and right, the airplane landed hard and crashed into terminal structures and burned. Both crew members and seven passengers died and the flight attendant and nine passengers survived.

Although the probable cause was found to be the pilot's loss of control from an asymmetric power condition, his unstabilized visual landing approach was considered a contributing factor to the accident. He was cited for his inability to "control the airplane in an attempt to recover from an asymmetric power condition at low speed following his intentional use of the beta mode of propeller operation (intentional zero to reverse thrust) to descend and slow the airplane rapidly on final approach for landing." The NTSB also noted the following contributing factors: an unstabilized visual landing approach from 6,000 feet with descent rates up to 2,200 feet per minute; the departure of a DC-9 from the same runway when the 212 was two miles on final; and, higher-than-normal fuel-flow settings on both engines that would have required a greater input of the beta mode. The board additionally noted that the lack of fire-blocking material in the seat cushions contributed to the severity of the injuries.

Shrouded Hill

Norway - May 7

D.H. Dash 7: Aircraft destroyed. Fatal injuries to 36.

Five minutes before it was due to land at Bronnoysund, the commuter aircraft crashed at the 300-foot level of a steep, 850-foot hill in rain and low visibility. The flight began at Trondheim and was making local stops along the coast with a final destination planned to have been Bodo.

The pilot had reported no problems during his last radio transmission to the control tower five minutes before the crash. The aircraft was determined to have strayed off course in weather that included low clouds and light drizzle.

A rescue helicopter reached the scene within 90 minutes of the accident and reported no signs of life in the still-burning wreckage.

Airship vs. Wayword Wind

Australia - May 6

Skyship 600: Propeller destroyed, puncture in gas bag.

A pilot was practicing rolling takeoffs as part of the training program leading to his upgrade to captain when a gust of wind hit the airship from the side. The force of the wind rolled the aircraft, causing the engine to strike the ground. The propeller shattered and debris punctured the gas bag. There were no reported injuries to the two persons aboard.

Landed Short

United States - July 26

Lear Jet: Aircraft destroyed, one fataility, one injury.

An IFR flight plan had been filed for the positioning flight from Allentown, Pa., to Morristown, N.J., but VMC conditions prevailed as the executive jet made the landing approach. According to preliminary information, only a pilot in the left seat and a company check pilot-designated CFI in the right seat were aboard.

The airplane was cleared to land. Witnesses reported that the jet appeared to "teeter back and forth" on the final leg. It reportedly hit the ground several hundred yards short of the runway and collided with a fence on the airport just short of the runway threshold. The aircraft was destroyed by fire and one crew member was killed; the other sustained serious injuries.

Cor/Exec.

Mountain On Final

Equador - June 3

Rockwell Sabre 40: Aircraft destroyed. Fatal injuries to 11.

The executive jet was carrying top military officials on a flight from an air base near Guayaquil to Quito. Two minutes before it was to land, the aircraft crashed into an Andean hillside northeast of the city. The aircraft was destroyed and all aboard were killed.

Civil aviation officials reported that rain and fog could have contributed to the accident.

Light In The Window

United Kingdom - April

Beech 200 King Air: Minor damage. No injuries.

During a climb through FL 190 to a cruise altitude of FL 270, a bang was heard from the rear of the passenger cabin. The pilot began an immediate descent. The copilot noted that the oxygen masks had dropped and that a window was cracked.

After a normal landing, an examination of the cracked window revealed that its shape was concave instead of the normal convex. Further investigation revealed that approximately 27 hours before, during an annual inspection, an area adjacent to the window was repainted and a halogen lamp was used to help dry the paint. It was considered possible that the heat from the lamp distorted the window, which led to its cracking after being subjected to subsequent pressurization cycles.

Checks of similar aircraft in the same fleet turned up another rear window that showed evidence that a halogen lamp had been placed too close to it. In this instance, the lamp had been placed adjacent to the rear window to illuminate the baggage compartment from the outside; the window was replaced as a precautionary measure.

Gear "Looked" Down

Australia - August 7

Cessna 402: Substantial damage. No injuries.

After lowering the gear in the landing pattern at Penneshaw, the pilot did not get a gear-down indication for the right main gear. He tried several methods but failed to obtain a safe gear-down indication for the suspect gear.

The pilot then made a fly-by and another pilot on the ground, who was using binoculars, reported that the gear appeared to be down. The aircraft pilot tried a landing but, after touchdown felt the right gear begin to collapse and the pilot executed a go-around. He flew to Adelaide where better facilities were available. He made several more attempts but failed to lock the recalcitrant gear down. During a final landing attempt, the right gear collapsed at about 30 kts and the airplane slid to a halt on a taxiway to the right of the runway.

It was determined that the lower and center drag link brace joints had been overtightened, possibly to eliminate looseness in the joint caused by wear. Also, the center brass bushings were shorter than the outer steel ones, allowing the nuts to tighten against the brace when they were tightened. Because of the excessive friction, the push-pull rod bent, preventing the gear from extending to the fully down and locked position.

Wheel Away!

United Kingdom - November 1987

Cessna 404: Minor damage. No injuries.

The Cessna had landed at Peppermenarti, Northern Territory, and was taxiing back along the runway. The pilot reported that the airplane was moving about 4 kts as he slowed down to turn off to the ramp, when the nose dropped and the airplane stopped.

Upon investigation, it was found that the nosewheel had completely detached and the oleo forks hit the pavement.

The cause was found to be a seized nosewheel bearing that had not been properly lubricated. When the bearing seized, the axle spun within the oleo support eyes, one of which failed from the generated heat and the other from the subsequent overload.

OGA

Jungle Crash

New Zealand - May 13

Piper PA-34 Seneca: Aircraft destroyed. Nine fatal injuries.

On a flight from Hamilton to Wanganui the twin-engine aircraft encountered turbulent weather and disappeared from radar as it was descending prior to landing.

Search helicopters found the airplane's wreckage on the side of a steep, bush-covered valley some 20 miles northwest of its destination. There were no survivors.

Low And Slow

United States - No date

Piper PA-18: Aircraft destroyed. Minor injury to one of two.

The pilot and his observer were flying the aircraft approximately 50 feet above the treetops during a bird survey.

To give the observer a better view, the pilot placed the airplane in a slip. However, the airplane stalled, and impacted the trees before he could recover. The aircraft was destroyed but the two occupants were both wearing personal protective equipment. Only the pilot was hurt, sustaining a minor injury.

Poor Visual Cues

Australia - November 20, 1987

Cessna 185: Substantial damage. Two of three drowned during escape.

The final report stated that while flying at a low height above an expanse of calm water, the pilot had few visual cues to judge the aircraft's clearance above the water. Also, the pilot was reported to have had a high enough blood alcohol level to have affected his visual acuity.

Prior to the accident, the aircraft had taken off from a strip near a reservoir and was flown at a low height above the calm, smooth water. Shortly after a left turn it struck the water near the middle of a dam. Water entered the front of the cabin and the engine stopped, but the airplane bounced back into the air and the pilot vainly tried to restart it. The airplane slid along the surface and began to sink.

The three occupants escaped the sinking airplane but only one made it to safety. Investigation revealed no mechanical malfunction. The report stated that the aircraft struck the water at a shallow descent angle. It was also determined that, at the time of impact, substantial power was being developed.

Rotor

Collision With Terminal

West Germany - May 6

Chinook: Aircraft destroyed. Fatal injuries to two, injuries to two crew and nine ground staff.

The helicopter with five on board had landed safely at Hannover Airport and was being repositioned by a ground crewmember to a parking location on a crowded ramp when the rear rotor hit a passenger-boarding stairway. The aircraft exploded in flames. Two crewmembers were killed and three others injured, plus nine civilians on the ground were injured.

Debris from the helicopter scattered over a 100-foot radius and damaged a bus and several nearby aircraft.

Lights Out

Switzerland - May 18

Helicopter/Cessna: Substantial damage. No injuries.

The helicopter was air-lifting the small general aviation aircraft to Lausanne for repairs. Shortly after takeoff the helicopter ran into trouble outside of Geneva and the pilot decided to jettison the load.

The Cessna fell onto high-tension wires causing a temporary interruption of electrical power to the city.

Tail Rotor Failure

United States - No date

Hughes 500D: Substantial damage. Minor injury to one of four.

The helicopter pilot was making a descending, circling approach. The landing area was a large, clear volcanic lava field with occasional dead tree snags. About 30 feet from the ground the tail rotor failed, causing the rotorcraft to spin rapidly to the right. It made two revolutions, hit the ground and came to rest on its left side.

Although the aircraft was destroyed, the only injury was a minor one to the pilot; all occupants were wearing personal protective equipment.

Broken Bracket

United States - April 2

Aerospatiale 316B: Substantial damage. No injuries.

The helicopter was transporting a critically ill patient. Collective control was suddenly lost and the aircraft began to descend. The pilot maintained cyclic control and executed an emergency, run-on landing on a road. After touchdown, the nose wheel collapsed and caused substantial damage to the rotorcraft. There were no injuries reported.

Investigation revealed that a bracket in the collective control system had broken, causing the loss of that function.

Whiteout

United States - April 1

Bell 206: Substantial damage. Serious injuries to three.

The EMS-configured rotorcraft was en route to an accident site when it entered a fog bank and the pilot lost forward visibility. He decided to abort the mission but felt the rotorcraft “strike something” and it entered autorotation. The pilot reported that he had experienced vertigo during the descent. The helicopter landed hard, sustaining substantial damage. The three on board — pilot, paramedic and flight nurse — were seriously injured.