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Flight Attendant Training Helps Prevent Injuries in Aircraft Ramp-area Collisions

Collisions between U.S. transport aircraft and ground vehicles, airport buildings or other aircraft typically did not cause injuries to the aircraft occupants during a number of occurrences reported in the 1990s. While such events occur unexpectedly, the safety engineering of aircraft, flight attendants' adherence to procedures and effective crew resource management are among the factors that reduce the risk of injury.

FSF Editorial Staff

Flight attendant training in the United States provides knowledge, skills and resources that can be adapted to any cabin emergency situation. Prescribing actions for every situation is not possible, however. Aircraft ramp-area collisions, for example, are not identified in the guidance material that principal operations inspectors of the U.S. Federal Aviation Administration (FAA) use to approve flight attendant training programs.[1] Specific drills for this scenario also are not among those prescribed for new-hire training, recurrent training or requalification training of U.S. flight attendants.

Nevertheless, elements of various training modules prepare cabin crews to respond to aircraft ramp-area collisions, and these scenarios may be presented as part of an airline's compliance with the FAA requirement to incorporate into flight attendant training information about actual aircraft accidents and incidents.

Based on a number of publicly available accident reports and incident reports from the 1990s, U.S. aircraft ramp-area collisions typically involved minor aircraft damage, no injuries to cabin occupants and no aircraft evacuation.[2] The typically low velocity of the transport aircraft (or other equipment) and the large difference in mass between the aircraft and the other equipment involved generally are important factors.

Barbara Dunn, president of the Canadian Society of Air Safety Investigators, said that aircraft incidents in which there are no injuries often are not recognized as a valuable source of information to improve cabin safety.[3] When cabin safety issues are part of airlines' internal incident investigations, opportunities emerge to update flight attendant training; improve emergency briefings; revise manuals and safety-information cards; evaluate emergency communications; and harmonize the procedures used by flight crews, cabin crews and gate agents, Dunn said.

In the United States, aircraft operators must report immediately to the U.S. National Transportation Safety Board (NTSB) all aircraft accidents and specific types of aircraft incidents.[4] The criteria in NTSB's definition of an accident include substantial damage, defined as "damage or failure which adversely affects the structural strength, performance or flight characteristics of the aircraft, and which would normally require major repair or replacement of the affected component." Substantial damage excludes "engine failure or damage limited to an engine if only one engine fails or is damaged, bent fairings or cowling, dented skin, small punctured holes in the skin or fabric, ground damage to [helicopter] rotor [blades] or [airplane] propeller blades, and damage to landing gear, wheels, tires, flaps, engine accessories, brakes or wing tips."

Aircraft ramp-area collisions that do not meet these accident criteria (substantial damage to an aircraft or deaths or serious injuries) also may not be reportable to NTSB as incidents. Thus, the total number of these events that occur in a given time period — and their severity — are difficult to determine.

Ron Welding, director of operations standards for the Air Transport Association of America, said that maintenance and support personnel are trained for servicing, turning around and dispatching an aircraft safely in the minimum amount of time possible.[5] Because so many activities are conducted quickly by diverse ramp vehicles — such as air-start units, maintenance lift vehicles, ground power units, aircraft-deicing vehicles, snowplows, container loaders, U.S. Postal Service vehicles, and trucks for fueling, commissary service, lavatory service and cleaning — the compact ramp area around an aircraft becomes very congested.

Welding said, "When an aircraft pulls up at a gate, vehicles come from all directions. To someone unfamiliar with ramp operations, the scene around the aircraft looks like chaos. There is not much maneuvering space, but there is reason and rhyme to this operation. Servicing and dispatching are well orchestrated; each person has a specific function. But it gets to be challenging: seasonally, for example, piles of snow may displace ground vehicles. Occasionally, something goes wrong."

The personnel involved in these operations recognize that an aircraft ramp-area collision is both a disservice to passengers and a major expense to the airline, he said.

"To help put this in perspective, there are more than 22,000 U.S. departures every day (not counting small regional aircraft) and ramp-area collision incidents are extremely rare," said Welding. "Ramp-area collisions have occurred while aircraft were parked at gates. The most common occurrence would involve a ground support vehicle — such as a commissary lift truck or a baggage loader — that approaches an aircraft improperly and comes in contact with the aircraft."

Typically, the cabin crew's response in an aircraft ramp-area collision would be directed by the flight crew following evaluation of the need for an evacuation, he said.

"If crewmembers do not identify a pressing need to evacuate — that is, there is no threat to safety by staying on the aircraft — it is safer for everyone to stay on the aircraft until they can be removed in a controlled, safe manner," said Welding. "The flight crew may want to bring airstairs over to the aircraft to deplane passengers, but each situation is different. Broad training prepares flight attendants to evaluate threats as the situation occurs and to take action based on the threat — including any type of collision in which an aircraft is moving under its own power."

Cabin Crew Actions May Compromise Safety

NTSB, in a 1992 special investigation report, cited an aircraft ramp-area collision among several accidents to highlight NTSB concerns about flight attendant training, adherence to procedures and other cabin safety issues.[6]

NTSB said that flight attendants usually provide the most immediate assistance to passengers during emergency situations. Their actions have saved lives and prevented or minimized injuries. Strong leadership by flight attendants also has been credited with reducing panic among passengers by providing firm direction and demonstrating the appropriate behavior.

NTSB said, "Flight attendants must immediately change from passenger-service-oriented roles to their critical safety-related roles in an emergency. Emergency situations typically require quick, assertive and decisive action with little time for analysis of the situation."[7]

Nevertheless, because emergencies rarely occur in commercial aviation, flight attendants do not demonstrate their proficiency in actual situations on a frequent basis. They must rely primarily on their initial training and recurrent training to guide their actions in emergency situations, NTSB said.

The special report also said that, in some situations, the actions of flight attendants "contributed to an increase in the number of injuries" and, in other situations, their actions "came very close to increasing the number of injuries." The flight attendants in some events studied, for example, had not complied with the regulations that required them to be at their duty stations with their restraints fastened during taxi.

The aircraft ramp-area collision cited in the special report showed how performance by a flight attendant may be affected by lack of knowledge of emergency equipment and procedures, and how a flight attendant may take actions contrary to training and not understand the consequences.

NTSB said, "On May 5, 1991, [a McDonnell Douglas MD-88] was struck by a baggage [van] while the airplane was taxiing to a terminal gate in Atlanta, Georgia[, U.S.] A fire erupted outside the airplane, and the flight attendants immediately initiated an emergency evacuation. While the lead flight attendant, who had three years and nine months experience, attempted to contact the cockpit [crew] on the interphone, 'panicked' passengers rushed toward her and slammed her against the L–1 main boarding door.

"A nonrevenue passenger, who had been seated in the first-class cabin, pulled passengers away from the door, allowing the flight attendant to open the door and deploy the evacuation slide. She believed [that] it was only with the assistance of the passenger that she was able to get passengers back far enough so that she could open the exit door. When she moved away

from the open exit, passengers pinned her against the cockpit bulkhead, and she could not reach the R–1 galley service door. The R–1 exit was opened by the same nonrevenue passenger who had initially assisted her at the L–1 exit. The [NTSB] found that although some flight attendants were responsible for opening two exits, they had not practiced opening two exits during their emergency-procedures training.

"The lead flight attendant stated that it was 'hard to get the [L–1] door open.' She believed that the door weighed more than the door trainer that had been used during her recurrent training, and she did not think that the door on the airplane would be harder to open than the training door. Although the slide inflated automatically, she reached for the manual-inflation handle because that was an action [that] she had practiced in training. Although the cabin was very dark, she did not activate the emergency light switch located at the forward flight attendant panel because flight attendants had not been trained to do so.

"In the same accident, a flight attendant, who had about seven years experience, was seated on the aft jumpseat when she heard a loud 'boom,' and saw passengers immediately get out of their seats. She could not see what caused passengers to get up because the jumpseat was 'so far back we could not see what happened.' She got up from her jumpseat, went to the aft galley and saw flames outside the galley service door.

"She returned to the aft jumpseat and opened the door in the pressure bulkhead, causing the tailcone exit to jettison. She entered the tailcone and saw that the evacuation slide was not inflated and mistakenly pulled the tailcone-release handle in an attempt to inflate the slide. She then took the correct action and threw the slide out of the tailcone, and the slide inflated. She thought [that] she had been taught to hold a handle at the end of the catwalk to keep [herself] from falling out [of the airplane], but she did not see a handle and thus did not hold on to anything. She stated that the tailcone-exit training mockup provided her with the experience of being inside a tailcone but that the 'darkness and height were different' and the noise (the engines were operating) while she was on the catwalk was not experienced during training.

"Contrary to the air carrier's procedures, she did not attempt to notify the cockpit [crew] before initiating the evacuation. Moreover, she did not hear the evacuation command from the pilots because she was inside the tailcone area and was sure that she 'had evacuated before they (the flight crew) had turned off their engines.'" [Normally, evacuations are not initiated until engines have been shut down.]

NTSB, in its final accident report, said that the baggage-transport van was being driven at night along the designated roadway between the main terminal building and an airport concourse.[8]

One serious injury and four minor injuries occurred among the 91 passengers during the evacuation; there were no injuries among the six crewmembers. The accident occurred in darkness; surface weather conditions were rain and fog.

The accident report said, "While crossing the first ramp area after exiting from under the terminal, the van collided with [the] MD-88. The ramp and aircraft were well lit and the aircraft was in the center of its assigned taxi lane. The left main landing gear rolled into the rear of the van and the van caught fire. … The van driver had been trained in accordance with FAA-required procedures and was aware of correct operating procedures. He stated [that] he did not see the aircraft." NTSB said that the probable cause of this accident was "the [van] driver's inadequate visual lookout and poor division of attention."

Ramp-area Collisions Reveal Pilots' Perceptions

Other than the NTSB special report, no descriptions of aircraft ramp-area collisions by flight attendants could be found in U.S. incident reports. Incident reports in the U.S. National Aeronautics and Space Administration (NASA) Aviation Safety Reporting System (ASRS), however, contain the following narratives of such events as observed from the flight deck:[9]

- "I was watching the right wing to ensure [that the wing] was clear, as the captain followed the marshaller's commands. During the turn, I advised the captain that the right wing looked clear; this was reinforced by the marshaller's continued command to exit the spot [where the aircraft was positioned]. The captain followed the commands of the marshaller, as he (the marshaller) has a better vantage point to ensure wing-tip clearance than I do. Soon, in the turn, we felt the aircraft collide with something. The captain immediately stopped and set the parking brake. It was only after we came to a complete stop that the marshaller signaled for us to stop. The vehicle contacted [by the airplane] was a tug positioned to tow a [ground power unit (GPU)] cart [that was] connected to the aircraft adjacent to ours. The damage was to the right navigation light and strobe light assembly, which was repaired and replaced by maintenance. All systems to the right wing, flight controls and lights were inspected and certified by maintenance for continued service. All passengers were deplaned while repairs were made and no injuries occurred due to this incident."[10]

- "A small tug pulling a baggage cart came into view off the right side of the aircraft and the driver was motioning for us to hold position. We assumed they wanted to load more bags and we stopped. The baggage cart driver … told me that there had been contact between a container loader and the right wing of the aircraft. … Ramp [control] cleared us into gate Y to allow further investigation. At no time did the captain or [I] see any ground equipment that appeared to be in the 'comfort zone' around the aircraft that would not allow for normal cautious taxi. We did not

feel any impact from contacting the container loader. Considering [that the collision] was steel versus aluminum, the damage to the aircraft was light (although expensive) and I believe [the damage] indicates that both vehicles were moving at very slow speed."[11]

- "[The marshaller] was signaling me to turn [the airplane] earlier than I thought was appropriate. I checked the wing clearance one more time myself. [The clearance] appeared close, but I thought that I would still clear. I then turned my attention back to the marshaller, who was continuing to signal aggressively for me to turn left. I trusted that he could see the wing clearance better than I could, so I followed his directions. It was at this point that the two aircraft wings collided. The impact felt was only a light bump and there were no injuries to crew or passengers. The time of day was midday on a bright sunny day. This caused a bright glare on both aircraft wings, making it more difficult to judge distance. Upon deplaning … [the marshaller said] that he did not even see that the wings had collided."[12]

- "Normal vehicular movements (baggage carts, push tugs, etc.) were operating on the adjacent ramp and parking spots. We observed nothing intruding into our taxi path, although normal [airport] operations call for very reduced clearances between aircraft [operations] and ramp operations. While on the taxiway centerline between gates, we felt a jolt from the right wing. The captain stopped the aircraft while I opened my window to view the wing tip. There was damage to the [wing] leading-edge slat visible from my window. After determining [that] there were no injuries on the aircraft, we started to taxi back to the gate. After making a 180-degree turn back to the gate, we saw the fuel truck that had collided with us. There was a fuel spill behind the truck that extended from the rear of the truck to approximately five feet [1.5 meters] past the taxiway and ramp borderline onto the taxiway. Apparently the fuel truck had backed onto the taxiway (without a marshaller) after the nose of the aircraft had passed, but before the wing had gone by. The fuel spill was from the truck's own fuel tank, not the large tank containing the jet fuel. Several passengers witnessed the collision."[13]

- "There was a Boeing 737 [B-737] on Taxiway J facing east and holding for us to pass. This aircraft may have obstructed the captain's vision, but [the captain] cleared the left side and forward. I cleared the right side and forward. The alleyway was clear and we proceeded to taxi toward the alleyway between Concourses Y and X. I observed nothing and was [setting] the no. 2 radio to call [airline dispatch] when the captain uttered a shout and slammed on the brakes. I then felt the aircraft being struck. A fuel truck had struck the front left wing. We determined that the aircraft was secure and passengers were OK and elected not to evacuate [the aircraft]. We called for airstairs (fire and rescue equipment were already on scene within minutes after being summoned by ramp [personnel] who had seen the whole thing). The passengers deplaned and were transported to the terminal."[14]

Incidents Show Various Ways Ramp-area Collisions Occur

The following examples from FAA and NTSB incident reports show various types of aircraft ramp-area collisions that occurred in the 1990s:

- A bag tug operator arrived at a Boeing 727 shortly after pushback. The flight crew was unaware that the tug operator was putting more bags on the airplane and applied power. The wing turned over the tug, causing minor aircraft damage and no injuries.[15]

- During pushback from the gate, the tailcone of a B-737 was struck by a passing catering truck. There were no injuries to the 112 people aboard the airplane.[16]

- During pushback from the gate, an MD-88 struck a container loader, causing minor damage to the right wing tip. There were no injuries to the 64 people aboard the airplane.[17]

- During pushback from the gate, the right winglet of a McDonnell Douglas MD-11 struck the right elevator of a parked Boeing 757 (B-757), causing minor damage to both aircraft. The winglet was replaced on the MD-11, the right elevator on the B-757 was replaced and the right horizontal stabilizer was repaired on the B-757. There were no injuries to the 123 people aboard the MD-11. The ramp was wet and slippery in heavy rain.[18]

- While being taxied into a congested gate area in close proximity to another parked aircraft, a fuel truck, a building and a jetway, a McDonnell Douglas DC-9 struck the rear of the fuel truck, causing minor damage (denting the skin of the left-wing leading-edge slat). Darkness and rain prevailed. There were no injuries to the 139 passengers or five crewmembers aboard the aircraft. The fuel truck had been struck in another incident by the same aircraft type while parked at the same gate.[19]

- While being taxied past a parked B-737, the left wing tip of a Boeing 767 (B-767) struck the right horizontal stabilizer and elevator of the B-737. The captain of the B-737 shut down the aircraft's one running engine and the auxiliary power unit; there were no fuel leaks, and neither flight crew conducted an evacuation of the passengers. Both aircraft were towed back to the gates. There were no injuries to the 139 passengers and five crewmembers aboard the B-737. There were no injuries to the 13 crewmembers, 206 passengers and 69 "other occupants" of the B-767. Damage to both aircraft was minor.[20]

- The captain of a British Aerospace BAe 146 signaled to ramp personnel to remove the wheel chocks while the parking brake was set and engines were running, then was unable to prevent the aircraft from colliding with the terminal building using the normal brake system or emergency brake systems. One gate agent received minor injuries. The flight crew, one flight attendant and 47 passengers on board the airplane were not injured. The airplane received minor damage.[21]

Many variations of such events have been reported by NTSB and FAA. The causes have been analyzed by airlines and their ramp-services contractors and have been addressed by ongoing ramp-safety campaigns. Damage has ranged from minor paint scratches to crushing of wing structures and perforation of the fuselage. Because of ramp-area accidents and pushback accidents in the mid-1990s, FAA told its aviation safety inspectors to place particular emphasis on the departure and arrival procedures being utilized by airlines.[22]

Standard Practices Prevent Injuries Among Passengers

As in the prevention of turbulence-related injuries in flight, the actions of flight attendants and passengers affect the risk of injury during an aircraft ramp-area collision. The following practices have been used successfully.[23]

While the aircraft is stationary in the ramp area, flight attendants normally should stay near the door for their duty station. Each flight attendant's position in the aircraft is an important part of readiness to respond to an unexpected event in the ramp area. While conducting predeparture cabin walkthroughs, flight attendants also should coordinate their relative positions in the cabin so that doors are not left unattended.

When the aircraft is in motion, flight attendants should comply with regulations that require them to be seated with their seatbelt and shoulder harness fastened except when they are conducting safety-related duties (such as safety demonstrations, seat belt checks and predeparture cabin checks).

Flight attendants should ensure that all carry-on bags have been stowed properly before the aircraft starts to move; otherwise, unstowed bags (especially in aisles or blocking exits) and improperly stowed carry-on items might cause injury during a sudden stop or impede the evacuation of the airplane. Nothing should be placed in front of emergency equipment or directly on top of emergency equipment.

Except for safety-related matters, cabin services to passengers should be suspended while the aircraft is in motion on the ground, and passengers should be told that flight attendants will resume attending to routine passenger requests when flight attendants are able to leave their seats.

Everything in the galley should be stowed according to U.S. Federal Aviation Regulations and company policies before the aircraft begins moving. If drinks are served before pushback, however, some airline policies allow passengers to keep the drinks during taxi, with flight attendants picking up the cups or glasses while conducting their walkthrough after the safety demonstration.

Upon seeing, hearing or feeling anything unusual that might affect safety during pushback or taxiing, a flight attendant's first action normally should be to contact the captain via the interphone. Many U.S. airlines emphasize the urgency of communicating safety-related anomalies to the flight deck as part of crew resource management (CRM) training. CRM covers methods of using all available resources to solve problems and good judgment in deciding when to communicate with the flight crew when the sterile-cockpit rule is in effect.[24]

If the flight crew is unable to address a flight attendant's concern during a critical phase of flight operations, they may not answer the interphone call, they may say that they are unable to talk immediately or they may judge quickly the importance of the report. The call also may generate questions by the flight crew. The interphone also should be used as a real-time link among pilots and cabin crewmembers, enabling multiple crewmembers to monitor communication about a situation.

Good communication between the flight crew and cabin crew also may include the practice of notifying flight attendants that the pilots are addressing a problem, but based on their preliminary assessment, the pilots do not believe that cabin crew action will be needed. A similar practice, while pilots are assessing the situation, is for the captain to alert the cabin crew to stand by for precautionary cabin preparations.

Passengers should be considered an important source of information. Flight attendants should listen carefully to every passenger report of unusual occurrences. Normally, the flight attendant should relay to the flight crew what passengers have reported before conducting an investigation, then should investigate further with the flight crew if necessary.

If there are indications that the aircraft has been involved in a ramp-area collision, the flight crew typically stops the aircraft suddenly and shuts down the engines to assess the situation and to decide the appropriate action.

After a ramp-area collision, a few minutes may elapse while the flight crew completes the appropriate procedures, checklists, damage assessment and emergency communications to ensure the safety of the aircraft. A flight crewmember typically makes an initial passenger-address system announcement (PA); but the captain might give instructions to a flight attendant to make the initial PA. The initial PA should be made as quickly as possible under the circumstances, typically directing flight attendants and passengers to remain seated while the aircraft comes to a complete stop and to keep seatbelts fastened while waiting for instructions from the captain.

Flight attendants should be ready take appropriate actions as soon as the captain makes a decision to evacuate the aircraft — or not to evacuate the aircraft — after a collision in the ramp area. The captain's decision-making process will weigh seriously the relative risks to passengers. The reasons for the captain's decision may not be apparent, however, and the decision often will consider input from observers outside the aircraft.

Flight attendants should be alert to the possibility of a passenger-initiated evacuation. Typically this means that flight attendants, as much as possible, should remain near doors and monitor passenger behavior near emergency exits. Passenger-initiated evacuations have occurred when passengers have had a high degree of fear about their immediate safety.

Flight attendants should be prepared to stop such an evacuation by physical interposition and by assertively telling any passenger who approaches a door or emergency exit to stop and sit down. Instructions to passengers should communicate clearly that they will be safer inside the aircraft under the circumstances. As reported in the NTSB special report, unwarranted evacuations also have been initiated by one or more members of the cabin crew because of a breakdown in crew communication or because cabin crewmembers have had incomplete information.

If there is no imminent hazard — such as smoke in the cabin, aircraft fire or aircraft fuel leak — keeping passengers aboard the aircraft following an aircraft ramp-area collision normally is the safest response. The reported accidents and incidents have included situations in which smoke, fire or fuel leaks occurred on other vehicles, but not on the aircraft involved.

Experience has shown that aircraft emergency evacuations inherently involve risks of injury. Moreover, evacuations via slides and overwing exits in the ramp area may involve exposure to adverse conditions such as jet blast, slippery surfaces, fuels, lubricants, moving vehicles, aircraft and equipment. In many incidents, the aircraft was not pulled back to a jetway and airstairs were not used until the damage was surveyed.

If the main door (or doors) with jetway access is still open when an aircraft ramp-area collision occurs — and the captain orders evacuation via the jetway — flight attendants should be ready to tell passengers what to do in a calm, direct manner so that passenger deplaning is rapid but controlled.

U.S. training of flight attendants emphasizes that an evacuation may be conducted any time during the taxi phase or takeoff phase of flight operations. The method of evacuation selected will depend on various factors, including time required to shut down the engines. Engine shutdown normally must be completed before the emergency exits can be opened and the slides can be deployed safely. When feasible, airstairs or a jetway may enable passengers to evacuate simply by walking off the aircraft. Sometimes these options are not possible, however, because of difficulty repositioning the aircraft or because qualified personnel are not available immediately to operate the jetway.

In any evacuation scenario, PAs and face-to-face crewmember directions should tell passengers unequivocally to leave personal possessions aboard the aircraft. Attention also should be given to aircraft lighting during evacuation (including exit signs and arrows, the floor-proximity escape-path lighting, cabin lighting and exterior lighting). Cabin lighting may have been adjusted to a low brightness level for a video passenger briefing, but should be adjusted to an appropriate level for safety. Otherwise, darkness in the cabin after an aircraft ramp-area collision could increase passenger anxiety about the condition of the aircraft and about crewmembers' control of the situation.

Misconceptions of Risks May Influence Crewmember Decisions

In its special report and in safety recommendations, NTSB has said that flight attendants need information to assist them in evaluating risks they face in incidents and accidents. The special report said, "For example, many flight attendants said that [they decided to take some actions because] they thought the airplane was about to 'explode' or 'blow up.' While flight attendant training should not minimize potential hazards, it should provide information about the greatest risks following an accident. Accident history reveals that explosions rarely occur and that the greatest risks are fire and toxic smoke. [NTSB] believes that flight attendants who understand these risks during emergencies will be better prepared to make decisions about passenger safety and their own safety."[25]

Through its principal operations inspectors, FAA reminded airlines in 1989 of the importance of flight attendant compliance with the regulation on being seated during taxi. FARs 121.391(d) said, "During takeoff and landing, flight attendants required by this section shall be located as near as practicable to required floor-level exits and shall be uniformly distributed throughout the airplane in order to provide the most effective egress of passengers in event of an emergency evacuation. During taxi, flight attendants required by this section must remain at their duty stations with safety belts and shoulder harnesses fastened except to perform duties related to the safety of the airplane and its occupants."

FAA in the late 1990s emphasized, through policy guidelines to FAA principal operations inspectors and airlines, the need for more comprehensive training of flight attendants who are assigned to open more than one floor-level exit door during an aircraft emergency evacuation.[26] NTSB had said that most recurrent training programs previously did not require flight attendants to practice opening more than one exit during drills, raising a concern that all usable exits might not be opened during an evacuation.[27]

FAA said that proper training can ensure that all available exits are used efficiently. Currently, U.S. training programs require flight attendants to demonstrate opening two assigned exits, to demonstrate opening the primary assigned

exit and a second-choice exit, and the skills of passenger-flow-control management, including the signals and commands necessary to maximize passenger evacuation from the aircraft. (Flow-control management training helps prepare flight attendants to continually appraise the condition of exits and to evaluate passenger use of exits in order to signal and direct passengers to available exits, including proper action in response to helpful, panicked or competitive passenger behavior.)

FAA similarly has reemphasized the need for pilots and flight attendants to receive training that covers appropriate procedures for forewarned evacuations, unforewarned evacuations and unwarranted evacuations.[28] Such training must be designed to ensure that these crewmembers can accomplish the following tasks:

- "Recognize and act promptly in situations requiring an aircraft emergency evacuation;
- "Communicate and coordinate throughout the evacuation process, until the evacuation is completed or terminated;
- "Use good judgment when there is a need to terminate aircraft evacuations; [and,]
- "Manage passenger safety following unwarranted evacuation, especially after passengers have egressed from the aircraft and are on the ramp or taxiway."

If an aircraft ramp-area collision occurs, flight attendants should prepare a written report of their observations about the incident while events are fresh in their memories. Details should be recorded — such as statements made by passengers and their seat numbers — to facilitate debriefings and safety improvements.♦

Notes and References

1. U.S. Federal Aviation Administration (FAA). Order 8400.10 *Air Transport Operations Inspector's Handbook*. CHG 10, Chapter 14, "Flight Attendant Training and Qualification Programs," Section 4, 1975D. "Aircraft ramp-area collisions" in this article are accidents and incidents in which a scheduled air carrier — operating under U.S. Federal Aviation Regulations (FARs) Part 121 with passengers aboard the airplane — was reported to have struck, collided with or contacted another aircraft, airport building or vehicle in the gate stop area, the gate entry/exit area or the ramp area outside the gate/entry exit, or was reported to have been struck by another aircraft or vehicle in these general areas.

2. Public accident/incident databases in the United States contain a number of reports of aircraft ramp-area collisions, but the databases do not categorize the reports in this manner. Depending on the type of aircraft damage, some aircraft ramp-area collisions are not required to be reported to U.S. aviation authorities and are omitted from these databases. Therefore, the databases provide examples of events that have occurred but do not support the identification of all aircraft ramp-area collisions.

3. Dunn, Barbara. "Cabin Safety: The Missing Piece of the Puzzle." *ISASI Forum* January–March 2000, 18–19.

4. NTSB Part 830, "Notification and Reporting of Aircraft Accidents or Incidents and Overdue Aircraft, and Preservation of Aircraft Wreckage, Mail, Cargo and Records." "Aircraft accident" means an occurrence associated with the operation of an aircraft that takes place between the time that any person boards the aircraft with the intention of flight and the time that all such persons have disembarked, and in which any person suffers death or serious injury, or in which the aircraft receives substantial damage. "Incident" means an occurrence other than an accident associated with the operation of an aircraft, which affects or could affect the safety of operations.

5. Welding, Ron. Interviews by Rosenkrans, Wayne. Alexandria, Virginia, U.S., May 8, 2000, and May 23, 2000. Flight Safety Foundation, Alexandria, Virginia.

6. U.S. National Transportation Safety Board (NTSB). "Special Investigation Report: Flight Attendant Training and Performance During Emergency Situations." Report no. NTSB/SIR–92/02, 1992.

7. NTSB, 35.

8. NTSB, 5–6. NTSB Aviation Accident/Incident Database Report no. ATL91FA090, May 5, 1991.

9. The U.S. National Aeronautics and Space Administration (NASA) Aviation Safety Reporting System (ASRS) is a confidential incident-reporting system. ASRS reports are voluntary and subject to several limitations. ASRS *Directline* (December 1998) said, "Reporters to ASRS may introduce biases that result from a greater tendency to report serious events than minor ones; from organizational and geographic influences; and from many other factors. All of these potential influences reduce the confidence that can be attached to statistical findings based on ASRS data. However, the proportions of consistently reported incidents to ASRS, such as altitude deviations, have been remarkably stable over many years. Therefore, users of ASRS may presume that incident reports drawn from a time interval of several or more years will reflect patterns that are broadly representative of the total universe of aviation-safety incidents of that type."

10. NASA ASRS Report no. 214061, June 1992.

11. NASA ASRS Report no. 250958, September 1993.

12. NASA ASRS Report no. 260065, December 1993.

13. NASA ASRS Report no. 331725, March 1996

14. NASA ASRS Report no. 412926, September 1998.

15. FAA Incident Data System Report no. 19911017059849C, Oct. 17, 1991.

16. FAA Incident Data System Report no. 19941015040679C, Oct. 15, 1994.

17. FAA Incident Data System Report no. 19930609022429C, June 9, 1993.

18. FAA Incident Data System Report no. 19961227043619C, Dec. 27, 1996.

19. NTSB Aviation Accident/Incident Database Report no. SEA97IA040, Dec. 20, 1996.

20. NTSB Aviation Accident/Incident Database Report no. NYC95IA114A and NYC95IA114B, May 19, 1995.

21. NTSB Aviation Accident/Incident Database Report no. CHI00IA037, Dec. 1, 1999.

22. FAA. "Aircraft Arrival/Departure Procedures." Joint Flight Standards Information Bulletin for Airworthiness (FSAW) and Air Transportation no. FSAW 94–15 (Extended).

23. Fuhrman, Brenda. Delta Air Lines In-flight Safety. Interview by Rosenkrans, Wayne. Alexandria, Virginia, U.S., May 8, 2000. Flight Safety Foundation, Alexandria, Virginia.

24. FARs Part 121.542 said that no flight crew member shall perform "any duties during a critical phase of flight except those duties required for the safe operation of the aircraft." Critical phases of flight include "all ground operations involving taxi, takeoff and landing, and all other flight operations conducted below 10,000 feet, except cruise flight." In addition, the FARs said that no flight crew member may engage in any activity that could distract a crewmember or interfere in any way with the proper conduct of the flight. "Nonessential communications between the cabin and cockpit crews" were prohibited.

25. NTSB, 29–30.

26. FAA. "Guidelines for Training Flight Attendants Assigned to Open More Than One Door During an Aircraft Emergency Evacuation." Flight Standards Handbook Bulletin for Air Transportation (HBAT) 96–04, March 22, 1996.

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Staff: Roger Rozelle, director of publications; Mark Lacagnina, senior editor; Wayne Rosenkrans, senior editor; Linda Werfelman, senior editor; Karen K. Ehrlich, production coordinator; Ann L. Mullikin, production designer; and Susan D. Reed, production specialist

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