



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: May 17, 2001

In reply refer to: A-01-23 through -26

Honorable Jane F. Garvey
Administrator
Federal Aviation Administration
Washington, D.C. 20591

Since 1973, the National Transportation Safety Board has issued more than 100 safety recommendations addressing runway incursions.¹ On May 6, 1986, the Safety Board issued a Special Investigation Report, "Runway Incursions at Controlled Airports in the United States,"² in which the Board made several safety recommendations to reduce the frequency of runway incursions. In 1990, the Board included the issue of airport runway incursions on its list of Most Wanted Transportation Safety Improvements after a fatal runway collision involving Eastern Airlines flight 111 (EAL111), a Boeing 727, and N44UE, a Beechcraft King Air A100,³ in Atlanta, Georgia, on January 18, 1990. This issue has remained on the Most Wanted Transportation Safety Improvements list every year since then.

¹ Federal Aviation Administration (FAA) Order 8020.11A, "Aircraft Accident and Incident Notification, Investigation and Reporting," defines a runway incursion as "any occurrence at an airport involving an aircraft, vehicle, person, or object on the ground, that creates a collision hazard or results in a loss of separation with an aircraft taking off, intending to take off, landing or intending to land."

² Special Investigation Report NTSB/SIR-86/01.

³ N44UE was cleared for an instrument landing system approach on runway 26R, and EAL111 was cleared for the same approach behind N44UE. Before N44UE was clear of the runway, EAL111 landed and struck N44UE. One person was killed, and one person was seriously injured. The description for this accident, DCA90MA017A/B, can be found on the Safety Board's Web site at <<http://www.nts.gov>>.

Further, on July 6, 2000, the Safety Board issued Safety Recommendations A-00-66 through -71 to the FAA regarding runway incursions. Specifically, the recommendations addressed the adequacy of ground movement safety systems and of certain air traffic control (ATC) procedures. In a September 6, 2000, letter to the Board, the FAA stated that it was addressing the intent of these recommendations through various activities, including the formation of working groups, the evaluation of technology, the review of existing procedures, and the issuance of a General Notice (GENOT). In a January 29, 2001, letter to the FAA, the Board classified Safety Recommendations A-00-66 through -68 “Open—Acceptable Response” and Safety Recommendations A-00-69 through -71 “Open—Unacceptable Response.”

The Safety Board is concerned that, despite the recommendations that the Board has previously issued and the emphasis placed on the issue by the FAA, runway incursions and collisions continue to occur. Since the issuance of the runway incursion-related safety recommendations in July 2000, the Board has identified additional safety issues concerning runway incursions and collisions related to intersection departures⁴ in connection with its investigation of a March 9, 2000, accident in Sarasota, Florida. This letter summarizes the Board’s rationale for issuing these additional recommendations.

Background

On March 9, 2000, about 1035 eastern standard time,⁵ a Cessna 172K, N79960, registered to Sarasota Flying Club, Inc., and operating as a 14 *Code of Federal Regulations* (CFR) Part 91 personal flight, and a Cessna 152, N89827, registered to Cirrus Aviation, Inc., and operating as a 14 CFR Part 91 instructional flight, collided during takeoff on runway 14 at Sarasota Bradenton International Airport (SRQ). (Figure 1 shows a partial diagram of SRQ.) Visual meteorological conditions prevailed at the time. No flight plans were filed, nor were they required to be. The airline transport-rated pilot and pilot-rated passenger⁶ on board N79960 and the commercial-rated flight instructor and student pilot on board N89827 were killed. Both airplanes were destroyed.

⁴ The Aeronautical Information Manual (AIM), Pilot/Controller Glossary, defines an intersection departure as “a departure from any runway intersection except the end of the runway.”

⁵ All times in this letter are eastern standard time, based on a 24-hour clock.

⁶ The pilot in the right front seat of N79960 held a pilot certificate issued by the FAA. The pilot in the left front seat held a pilot certificate issued by the Canadian Civil Aviation Authority. Although the investigation could not determine which pilot in N79960 was operating the controls, only the right seat pilot was certified by the FAA; therefore, he was the only pilot on board authorized to act as pilot-in-command. Accordingly, this letter will refer to the right seat pilot as “the pilot” and the left seat pilot as “the pilot-rated passenger.”

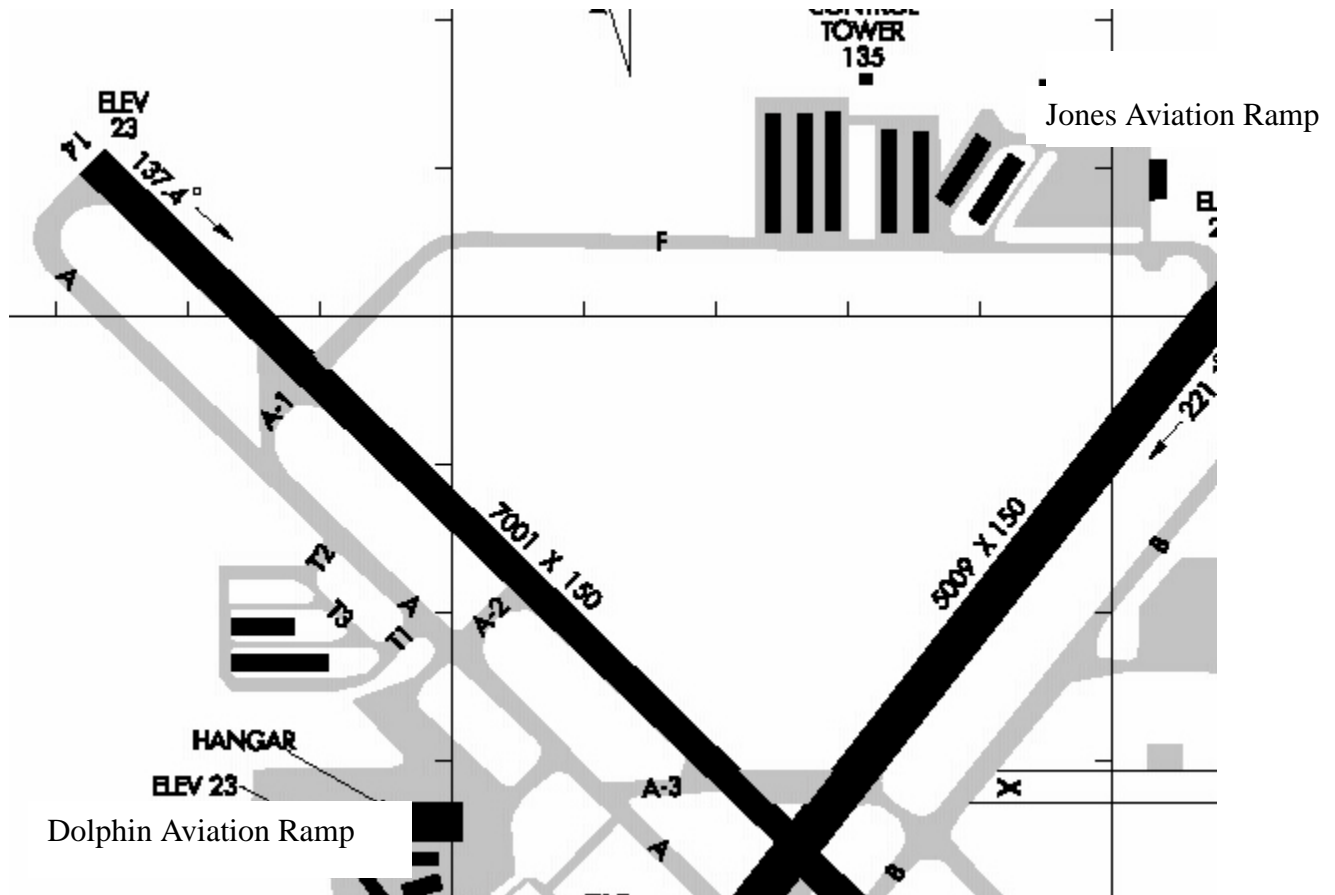


Figure 1. Diagram of SRQ.

At 1024:46, the pilot of N89827 called the SRQ ground control/clearance delivery controller (GC) requesting a visual flight rules departure. N89827 originated at the Dolphin Aviation ramp, located on the south side of SRQ. At 1025:24, the SRQ GC instructed N89827 to “taxi to runway [14].” Taxiway A, which is adjacent to the Dolphin Aviation ramp, runs parallel to runway 14 and joins it at the end. N89827 proceeded to runway 14 via taxiway A. As the GC issued the taxi instructions to N89827, he was relieved by the supervisor/ground controller (SGC). The GC provided a relief briefing to the SGC and left the tower cab. At 1028:03, the pilot of N79960 transmitted to ground control that he was “at [J]ones and ready to taxi.” The Jones Aviation ramp is on the north side of SRQ; aircraft originating at the Jones Aviation ramp intending to use runway 14 are normally assigned intersection departures from taxiway F. At 1028:45, the SGC cleared N79960 to “taxi to runway [14].” The pilot of N79960 was required by 14 CFR 91.129(i)⁷ to hold at the intersection of runway 14 and taxiway F, and he did so.

FAA Order 7110.65, “Air Traffic Control,” paragraph 3-1-4, “Coordination Between Local and Ground Controllers,” states that “[l]ocal and ground controllers shall exchange

⁷ Section 91.129(i), “Takeoff, Landing, Taxi Clearance,” states that “[a] clearance to ‘taxi to’ the takeoff runway assigned to the aircraft is not a clearance to cross that assigned takeoff runway, or to taxi on that runway at any point.”

information as necessary for the safe and efficient use of airport runways and movement areas. This may be accomplished via verbal means, flight progress strips, other written information, or automation displays.” Although the pilot’s reported position at the Jones Aviation ramp would suggest an intersection departure at taxiway F, the SGC annotated the flight progress strip for N79960 to indicate that it would be positioned for takeoff from the approach end of runway 14. The SGC told investigators after the accident that he did not recall N79960 originating at the Jones Aviation ramp and that his issuance of the taxi instructions to runway 14, with no mention of the taxiway F intersection, indicated that he must have thought that the airplane was originating at the Dolphin Aviation ramp.

At 1030:42, the pilot of N89827 made his first contact with the local controller (LC), stating that he was “ready for takeoff.” (About the time of this transmission, another airplane, a Cessna 172, N52553, was positioned behind N89827 on taxiway A waiting for departure.) At 1032:46, the pilot of N79960 made his first contact with the LC, stating, “we’re number two ready for takeoff.” (About the time of this transmission, N79960 was positioned behind another airplane, N5287V, which was on taxiway F waiting for an intersection departure.) At 1033:57, the LC instructed N89827 to “taxi into position and hold” and stated, “traffic will depart downfield also.” At 1034:22, the LC cleared N5287V for takeoff from the taxiway F intersection. After N5287V’s departure, at 1034:43, the LC cleared N89827 for takeoff from the approach end of runway 14. At 1034:47, the pilot of N89827 acknowledged the takeoff clearance. At 1034:51, the LC instructed N79960 to “taxi into position and hold” on runway 14, which the pilot acknowledged. About 6 1/2 seconds elapsed between the two pilots’ transmissions.

According to a postaccident interview with the LC, on the basis of the information in the flight progress strip, he believed that N79960 was positioned for takeoff at the approach end of runway 14. It would have been difficult for the LC to visually distinguish between the second airplane waiting at taxiway A (N52553) and the second airplane waiting at taxiway F (N79960) because they were both motionless Cessna 172s. Therefore, when N89827 began its takeoff roll from the approach end of runway 14, the LC erroneously believed that it was safe to instruct N79960 to taxi onto the runway for departure. Witnesses stated that when N89827 obtained takeoff speed near the 6,000-foot remaining marker (about 200 feet from the collision point), N79960 entered the runway from a taxiway on the left side of the runway. When N79960 entered the runway at intersection F, the two airplanes collided.

The Safety Board determined that the probable cause of this accident was the failure of the SGC and the LC to provide effective separation between the accident airplanes on the runway, resulting in a collision during takeoff. Contributing to the accident was the failure of the pilot and pilot-rated passenger on board N79960 to ensure that the runway was clear of traffic before taxiing onto the runway. Also contributing to the accident was the failure of ATC guidance and procedures to incorporate redundant methods of verifying aircraft position for both controllers and pilots.

During its investigation of this accident, the Safety Board identified several safety issues regarding ATC procedures and pilot position reports that it believes the FAA should address.

Air Traffic Control Procedures

When the pilot of N79960 initially contacted ground control and stated, “at [J]ones and ready to taxi,” the SGC did not take into account the location of the airplane before issuing the taxi instruction to “taxi to runway [14].” FAA Order 7110.65, “Air Traffic Control,” paragraph 3-1-7, “Position Determination,” directs controllers to “[d]etermine the position of an aircraft before issuing taxi instructions or takeoff clearance.” In addition, paragraph 3-7-1, “Ground Traffic Movement,” instructs controllers to “[s]tate the runway intersection when authorizing an aircraft to taxi into position to hold or when clearing an aircraft for takeoff from an intersection.”⁸

When issuing taxi clearances, the SGC sometimes read back the starting position reported by the pilot (for example, “from Jones...”) or specified a direction of taxi (for example, “taxi west bound to runway 14”). This technique served as an effective confirmation of the aircraft’s position and/or taxi route. However, the SGC did not use this technique when issuing the taxi clearance to N79960. There is currently no FAA requirement for tower controllers to read back pilot-reported starting points when issuing taxi instructions, although there previously was such a requirement.⁹ In addition, the FAA does not require tower controllers to use any other technique to verify that an aircraft’s position has been correctly understood. Such backup methods would likely allow controllers and/or pilots to catch errors that may lead to potential runway incursions or collisions.

The Safety Board recognizes that at some airports, a readback of pilot-reported positions may increase frequency congestion to unacceptable levels; therefore, other methods of confirming aircraft locations may be preferable at such airports.¹⁰ For example, including information on flight progress strips about the aircraft’s origination point could serve as a tool for controllers to verify the aircraft’s correct position. Arranging flight progress strips according to the aircraft’s intended takeoff location might also provide effective means by which controllers can verify aircraft positions. The SRQ tower did not have a formal method of managing flight progress strips. If the facility had had a more structured method of strip management, such as

⁸ As a result of the February 1, 1991, runway collision at Los Angeles, California, on December 3, 1991, the Safety Board issued Safety Recommendation A-91-115, which asked the FAA to “[d]evelop for inclusion in the Airman’s Information Manual and the Air Traffic Control Handbook (7110.65F) specific phraseology to be used by pilots when requesting an intersection departure and specific phraseology to be used by controllers when issuing a position-and-hold clearance for an intersection departure.” On April 16, 1993, this recommendation was classified “Closed—Acceptable Action.”

⁹ On August 10, 1973, the Safety Board issued Safety Recommendation A-73-54, which asked the FAA to “[r]equire flight crews to report their aircraft position on the airport when establishing radio communications with controllers, and require the controllers to read back the reported aircraft position when it cannot be verified either visually or by means of radar.” In response to this recommendation, on November 29, 1973, the FAA issued GENOT 7110.322, which required controllers to repeat an aircraft’s reported position before issuing a taxi or takeoff clearance. (On August 14, 1974, Safety Recommendation A-73-54 was classified “Closed—Acceptable Action.”) This GENOT is no longer effective. Board investigators asked the FAA why this GENOT is no longer effective; the FAA indicated that it had no record of the history of the GENOT.

¹⁰ Another method of confirming aircraft locations is marking the location of aircraft with color-coded chips on a magnetic diagram of the airport. (SRQ did not use this method.)

separately arranging or sequencing the strips for full-length and intersection departures, the LC might have visually scanned the airport and noticed that the number and type of airplanes waiting to depart from the two locations did not match the number and type of airplanes represented by the flight progress strips. This would likely have suggested to the LC that he had misunderstood the location of at least one of the airplanes.¹¹

Therefore, to aid controllers in determining the position of aircraft before issuing taxi instructions or takeoff clearances, the Safety Board believes that the FAA should amend FAA Order 7210.3, "Facility Operation and Administration," to direct ATC tower facility managers to include standard procedures in the Facility Standard Operating Procedures manual that will assist ground and local controllers in confirming aircraft locations on the airport. Such procedures may include, but are not limited to, reading back the pilot's stated position, annotating flight progress strips to indicate the aircraft's starting point, posting or arranging flight progress strips according to the aircraft's intended takeoff location, marking the location of aircraft with color-coded chips on a magnetic diagram of the airport, or other procedures appropriate to the specific facility or airport.

When the LC instructed N79960 to "taxi into position and hold," he did not mention taxiway F in that transmission. There is no FAA requirement for the LC to specify an aircraft's location if the aircraft is departing full length. Therefore, the LC's instruction was consistent with his stated belief that the aircraft was holding short of the approach end of runway 14 on taxiway A. However, when a controller authorizes an aircraft to enter a runway, there should be no opportunity for ambiguity or misinterpretation. If the LC had included his understanding of the airplane's position in the clearance authorization (such as "full length" or "from taxiway A"), the pilot might have detected the LC's misunderstanding and corrected it. Therefore, the Safety Board believes that the FAA should amend FAA Order 7110.65, "Air Traffic Control," paragraph 3-7-1, "Ground Traffic Movement," to require that, when a combination of intersection and full-length departures are routinely being used at an airport, controllers state the aircraft's location with regard to the takeoff runway. Further, the Safety Board believes that the FAA should advise tower controllers and pilots that intersection departure operations may involve a higher level of risk of conflict with other aircraft, vehicles, or objects, and remind them to treat intersection departures with caution and should emphasize to controllers the provisions of FAA Order 7110.65, "Air Traffic Control," paragraph 3-7-1, "Ground Traffic Movement," which instructs controllers to "[s]tate the runway intersection when authorizing an aircraft to taxi into position to hold or when clearing an aircraft for takeoff from an intersection."

Pilot Position Reports

The AIM, paragraph 4-3-10, "Intersection Takeoffs," states that "[a]n aircraft is expected to taxi to (but not onto) the end of the assigned runway unless prior approval for an intersection departure is received from ground control" and advises pilots to "state their position on the airport when calling the tower for takeoff from a runway intersection."¹² The AIM,

¹¹ The Safety Board notes that after the accident, SRQ amended its Standard Operating Procedures manual to incorporate guidance on standard strip marking for intersection departures.

¹² In addition, the AIM, paragraph 4-3-10(a), states that "[i]n order to enhance airport capacities, reduce taxiing

paragraph 4-3-18, “Taxiing,” also advises pilots to “[a]lways state your position on the airport when calling the tower for taxi instructions.” The pilot of N79960 told ground control that he was at the Jones Aviation ramp, thereby indicating that he would most likely be taxiing to runway 14 via taxiway F and, therefore, would likely be expecting a clearance for an intersection departure. However, when contacting the LC, the pilot did not state that he was at the taxiway F intersection. This eliminated an opportunity for the LC to recognize the error on the flight progress strip (which indicated that the airplane was positioned for a full-length departure rather than an intersection departure). It is possible that the pilot believed that his statement to the LC (“number two...for takeoff”) shortly after the LC’s discussion with another pilot who was holding short of runway 14 at intersection F¹³ adequately implied that he was waiting behind that other airplane on taxiway F.

As previously noted, the AIM advises pilots to state their position to ATC only when calling the tower for taxi instructions and for takeoff from an intersection. However, many airports routinely use intersection departures (like SRQ) or have multiple local or ground controller positions. At such airports, following the AIM advisories would not necessarily always result in pilots informing each controller who could benefit from the information of their position. Therefore, the Safety Board believes that the FAA should amend the AIM to include an advisory that, when operating on an airport, pilots should state their position whenever making initial contact with any tower or ground controller, regardless of whether they have previously stated their position to a different controller.

Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Amend Federal Aviation Administration Order 7210.3, “Facility Operation and Administration,” to direct air traffic control tower facility managers to include standard procedures in the Facility Standard Operating Procedures manual that will assist ground and local controllers in confirming aircraft locations on the airport. Such procedures may include, but are not limited to, reading back the pilot’s stated position, annotating flight progress strips to indicate the aircraft’s starting point, posting or arranging flight progress strips according to the aircraft’s intended takeoff location, marking the location of aircraft with color-coded chips on a magnetic diagram of the airport, or other procedures appropriate to the specific facility or airport. (A-01-23)

distances, minimize departure delays, and provide for more efficient movement of air traffic, controllers may initiate intersection takeoffs as well as approve them when the pilot requests. If for [any] reason a pilot prefers to use a different intersection or the full length of the runway or desires to obtain the distance between the intersection and the runway end, [the pilot is expected to inform ATC accordingly].”

¹³ At 1031:15, in response to the LC’s question, “who’s at the approach end of [14] ready to depart,” the pilot of N89827 responded “eight two seven.” After the LC responded, “I show you at foxtrot,” the pilot of another aircraft, N5287V, indicated that he was positioned at the taxiway F intersection with runway 14. At 1032:40, the LC stated, “eight seven victor and eight two seven we’ll get you outta here momentarily.” Just after the pilot of N5287V acknowledged this transmission, the pilot of N79960 transmitted, “this is nine six zero number two ready for takeoff.”

Amend Federal Aviation Administration Order 7110.65, "Air Traffic Control," paragraph 3-7-1, "Ground Traffic Movement," to require that, when a combination of intersection and full-length departures are routinely being used at an airport, controllers state the aircraft's location with regard to the takeoff runway. (A-01-24)

Advise tower controllers and pilots that intersection departure operations may involve a higher level of risk of conflict with other aircraft, vehicles, or objects, and remind them to treat intersection departures with caution. Emphasize to controllers the provisions of Federal Aviation Administration Order 7110.65, "Air Traffic Control," paragraph 3-7-1, "Ground Traffic Movement," which instructs controllers to "[s]tate the runway intersection when authorizing an aircraft to taxi into position to hold or when clearing an aircraft for takeoff from an intersection." (A-01-25)

Amend the Aeronautical Information Manual to include an advisory that, when operating on an airport, pilots should state their position whenever making initial contact with any tower or ground controller, regardless of whether they have previously stated their position to a different controller. (A-01-26)

Acting Chairman CARMODY and Members HAMMERSCHMIDT, BLACK, and GOGLIA concurred in these recommendations.

By: Carol J. Carmody
Acting Chairman