



National Transportation Safety Board

Washington, DC 20594

Safety Recommendation

Date: July 1, 2013

In reply refer to: A-13-024

The Honorable Michael P. Huerta
Administrator
Federal Aviation Administration
Washington, DC 20591

We are providing the following information to urge the Federal Aviation Administration (FAA) to take action on the safety recommendation issued in this letter. This recommendation addresses existing FAA separation standards and operating procedures. The recommendation is derived from the National Transportation Safety Board's (NTSB) investigation and/or review of numerous recent airport events and is consistent with the evidence we found and the analysis we performed. As a result of this investigation, the NTSB has issued one safety recommendation, which is addressed to the FAA. Information supporting this recommendation is discussed below.

The NTSB has recently investigated or reviewed numerous events in which air carrier aircraft that were executing a go-around¹ came within hazardous proximity of other landing or departing aircraft. These events have occurred at airports where air traffic control (ATC) procedures permit independent takeoff and landing operations on nonintersecting runways with intersecting arrival or departure paths (see figure 1) and have resulted in flight crews having to execute evasive maneuvers at low altitude to avoid collisions. The NTSB is concerned that existing FAA separation standards and operating procedures are inadequate to prevent such events and need to be revised to ensure safe separation between aircraft.

¹ The FAA's *Airplane Flying Handbook*, FAA-H-8083-3A, chapter 8, "Approaches and Landings," states the following: "Whenever landing conditions are not satisfactory, a go-around is warranted. There are many factors that can contribute to unsatisfactory landing conditions. Situations such as air traffic control [ATC] requirements, unexpected appearance of hazards on the runway, overtaking another airplane, wind shear, wake turbulence, mechanical failure and/or an unstabilized approach are all examples of reasons to discontinue a landing approach and make another approach under more favorable conditions....The go-around is not strictly an emergency procedure. It is a *normal* maneuver that may at times be used in an emergency situation....Although the need to discontinue a landing may arise at any point in the landing process, the most critical go-around will be one started when very close to the ground. Therefore, the earlier a condition that warrants a go-around is recognized, the safer the go-around/rejected landing will be." A go-around may be directed by ATC or initiated by the pilot. The flight crew does not need permission from ATC to execute the maneuver.

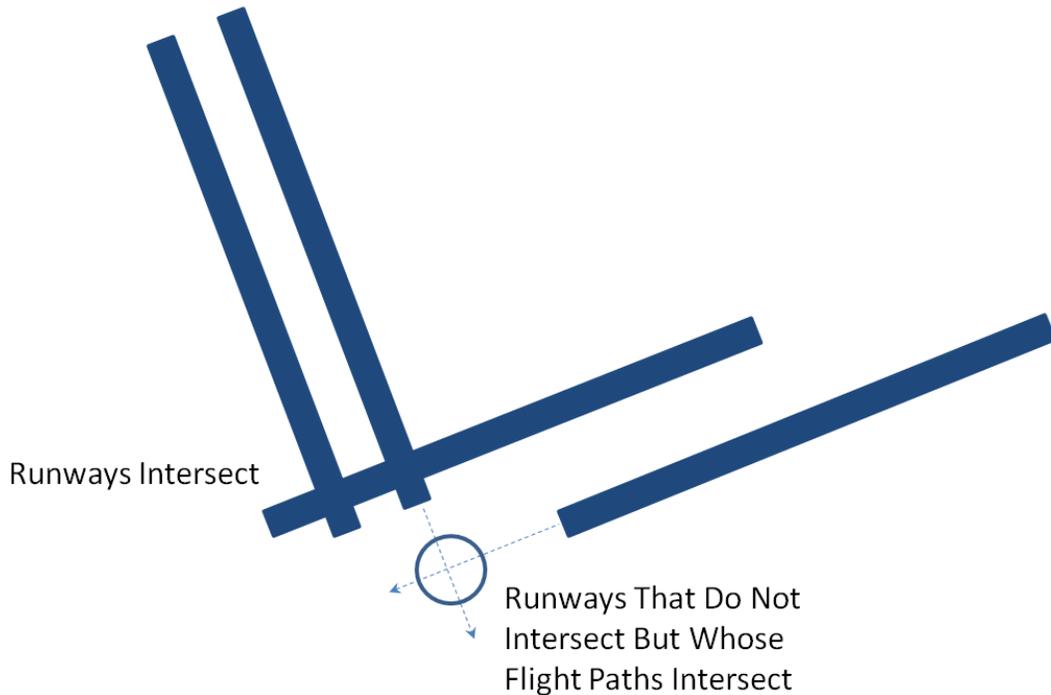


Figure 1. An example of runway configurations where simultaneous independent runway operations occur.

Recent Events

Dotcom Flight 2374 and Spirit Airlines Flight 511, Las Vegas, Nevada

On July 30, 2012, about 1944 coordinated universal time (UTC), two airplanes came within hazardous proximity of one another at Las Vegas-McCarran International Airport (LAS), Las Vegas, Nevada,² when Spirit Airlines flight 511, an Airbus Industries A319, was executing a go-around from runway 19L and Dotcom flight 2374, a Cessna Citation 510, was landing on runway 7R (see figure 2). Runways 19 L/R and 7L intersect and may not be operated independently of one another. Runway 7R is located approximately 1,000 feet south of runway 7L and does not intersect any other landing surface, permitting controllers to conduct arrival and departure operations independently of all other runways; however, the flightpath of runway 19L intersects the flightpath of runway 7R. The airplanes were being controlled by separate LAS ATC tower controllers operating on different frequencies. The pilot of Spirit Airlines flight 511 announced that the airplane was “on the go,” and the air traffic controller immediately responded with “traffic ahead and to your right landing 7R is a Citation out of 2600 off your right.” The transmission was not acknowledged, and the controller

² LAS is one example of an airport that has runway layout and procedures that facilitate independent converging runway operations.

instructed Spirit Airlines flight 511 to “expedite your climb.” The pilot of Spirit Airlines flight 511 never reported Dotcom flight 2374 in sight.

When the controller responsible for Dotcom flight 2374 recognized that Spirit Airlines flight 511 was executing a go-around, he notified the Dotcom flight 2374 pilot of the position of Spirit Airlines flight 511 but did not provide any control instructions to ensure that the airplanes avoided one another. According to recorded radar data, the pilot of Dotcom flight 2374 turned the airplane off of the final approach course to the left to pass behind Spirit Airlines flight 511, then turned back to the runway and landed on runway 7R. Spirit Airlines flight 511 passed in front of and slightly above Dotcom flight 2374 on short final. The reported closest proximity was 0.21 nautical miles (nm) laterally and 100 feet vertically. There were no injuries reported to passengers or flight crew and no damage reported to either airplane.

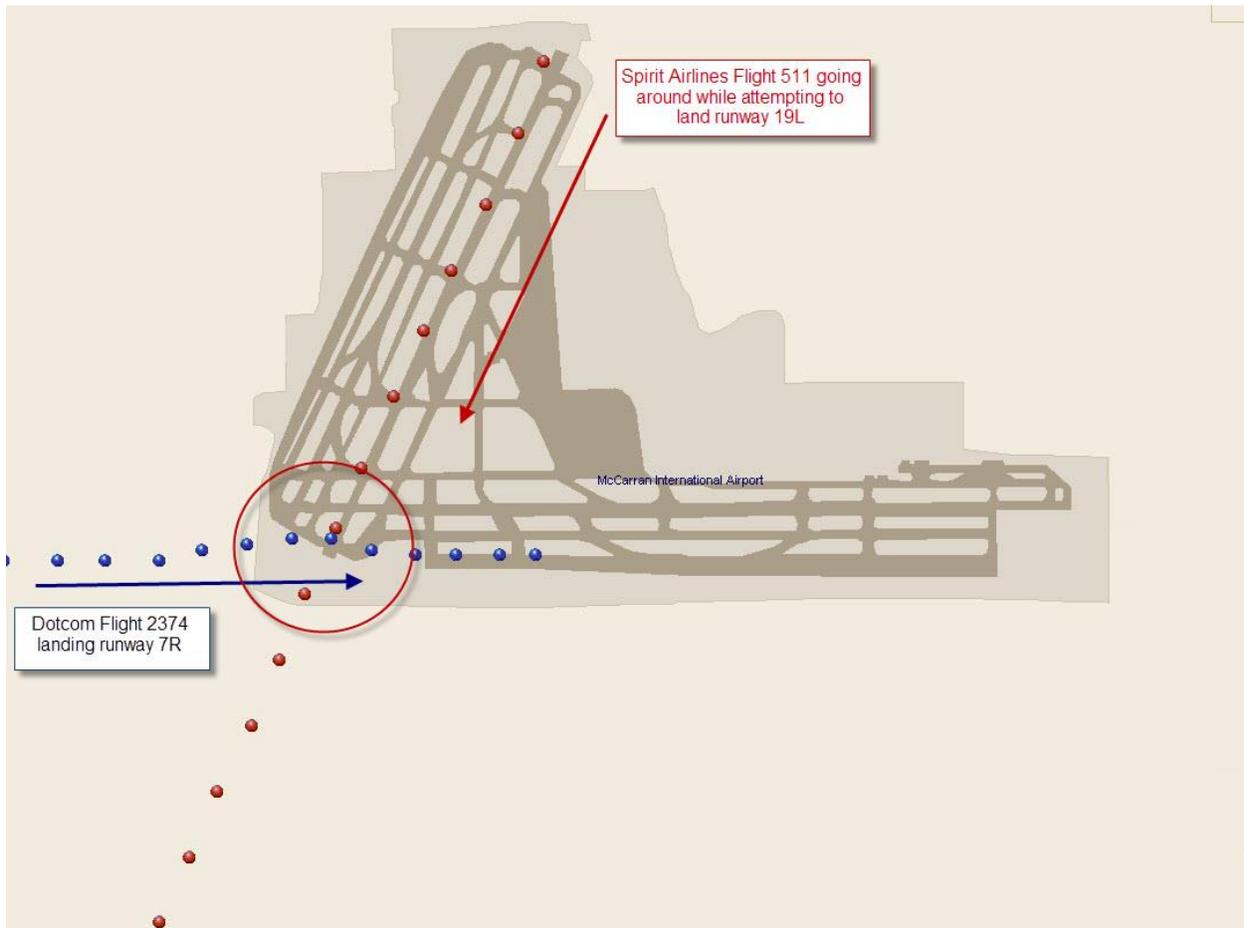


Figure 2. Spirit Airlines flight 511 (red dots) executed a go-around while attempting to land on runway 19L. Dotcom flight 2374 (blue dots) was simultaneously landing on runway 7R.

American Airlines Flight 534 and Pinnacle Airlines Flight 3843, Jamaica, New York

On July 30, 2012, about 2004 UTC, two airplanes came within hazardous proximity of one another at John F. Kennedy International Airport (JFK), Jamaica, New York, when American Airlines flight 534, a Boeing 737, was executing a go-around while attempting to land

on runway 22L and Pinnacle Airlines flight 3843, a Bombardier CRJ 200 regional jet (RJ), was departing from runway 13R (see figure 3). Runway 13R does not intersect runway 22L; however, the flightpath of runway 13R intersects runway 22L. The airplanes were being controlled by separate JFK ATC tower controllers operating on different frequencies. When the pilot of American Airlines flight 534 notified ATC of the go-around, the controller instructed the pilot to “climb and maintain 2000 feet, traffic off to your left is an RJ turning southbound, turn left immediately heading 130.” The pilot responded and began the maneuver. The controller asked the pilot of American Airlines flight 534 if Pinnacle Airlines flight 3843 was in sight, and the pilot responded “We’re turning as tightly as we can.” When the controller asked the pilot of American Airlines flight 534 about the assigned altitude of 2,000 feet, the pilot responded “Negative, we are trying not to hit this aircraft off our right.” The controller responsible for Pinnacle Airlines flight 3843 had transferred communications to New York Departure Control and was no longer able to provide the pilot with control instructions or traffic advisories. American Airlines flight 534 returned for landing, and Pinnacle Airlines flight 3843 continued to its destination. There were no injuries reported to passengers or flight crew and no damage reported to either airplane.

Because of previous conflicts similar to the situation involving American Airlines flight 534 and Pinnacle Airlines flight 3843, JFK had been the subject of an FAA review of the runway configuration by the FAA Flight Standards Office, AFS-450, in 2009 that resulted in the establishment of an arrival/departure window (ADW) on the runway 22L final approach course. The ADW is an imaginary box including the area between 1 and 3 nm from the runway threshold. The intent of the ADW was to prevent conflicts between runway 13R departures and runway 22L arrivals by requiring the departure aircraft from runway 13R to be rolling for takeoff before the runway 22L arrival aircraft entered the ADW. Pinnacle Airlines flight 3843 was cleared for takeoff when American Airlines flight 534 was about 3.7 nm away from the runway 22L threshold. However, Pinnacle Airlines flight 3843 did not begin the takeoff roll until American Airlines flight 534 was inside the ADW. Consequently, the separation intended to be ensured through use of the ADW procedures was not ensured. Under the circumstances, the tower controller should have canceled the takeoff clearance for Pinnacle Airlines flight 3843 but did not do so. The two airplanes came within 0.3 nm laterally and 300 feet vertically following the evasive maneuvers by American Airlines flight 534.

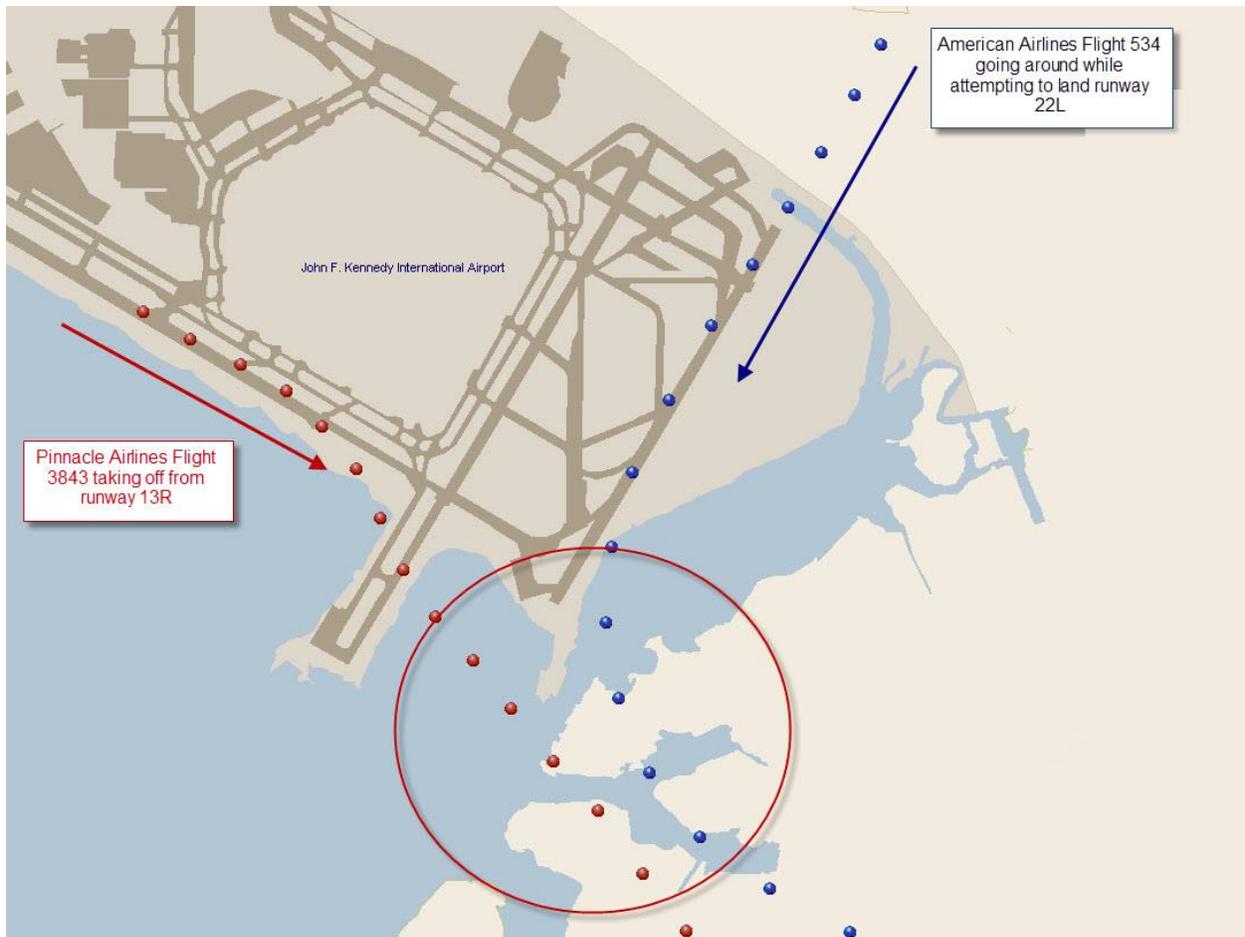


Figure 3. American Airlines flight 534 (blue dots) executed a go-around while attempting to land on runway 22L. Pinnacle Airlines flight 3843 (red dots) was simultaneously cleared for takeoff from runway 13R.

Expressjet Flight 4529 and Air Wisconsin Flight 4039, Charlotte, North Carolina

On July 14, 2012, about 1544 UTC, two airplanes came within hazardous proximity of one another at Charlotte International Airport (CLT), Charlotte, North Carolina, when Expressjet flight 4529, an Embraer 145 RJ, was executing a go-around while attempting to land on runway 23 and Air Wisconsin flight 4039, a Canadair RJ, was simultaneously departing from runway 18C (see figure 4). Runway 18C does not intersect runway 23; however, the flightpath of runway 23 intersects runway 18C. The airplanes were being controlled by separate CLT ATC tower controllers operating on different frequencies. When the pilot of Expressjet flight 4529 indicated that he was going around, the air traffic controller instructed the pilot to “Fly heading 270, climb and maintain 4000, traffic departing runway 18C beneath you.” The pilot of Expressjet flight 4529 did not confirm the transmission and never reported the conflicting departure in sight. The controller handling Air Wisconsin flight 4039 provided the pilot with a traffic advisory about Expressjet flight 4529 but issued no control instructions to resolve the conflict. The two airplanes passed within 0.16 nm laterally and 400 feet vertically of each other as Expressjet flight 4529 approached runway 18C. Expressjet flight 4529 returned for landing,

and Air Wisconsin flight 4039 continued to its destination. There were no injuries reported to passengers or flight crew and no damage reported to either airplane.

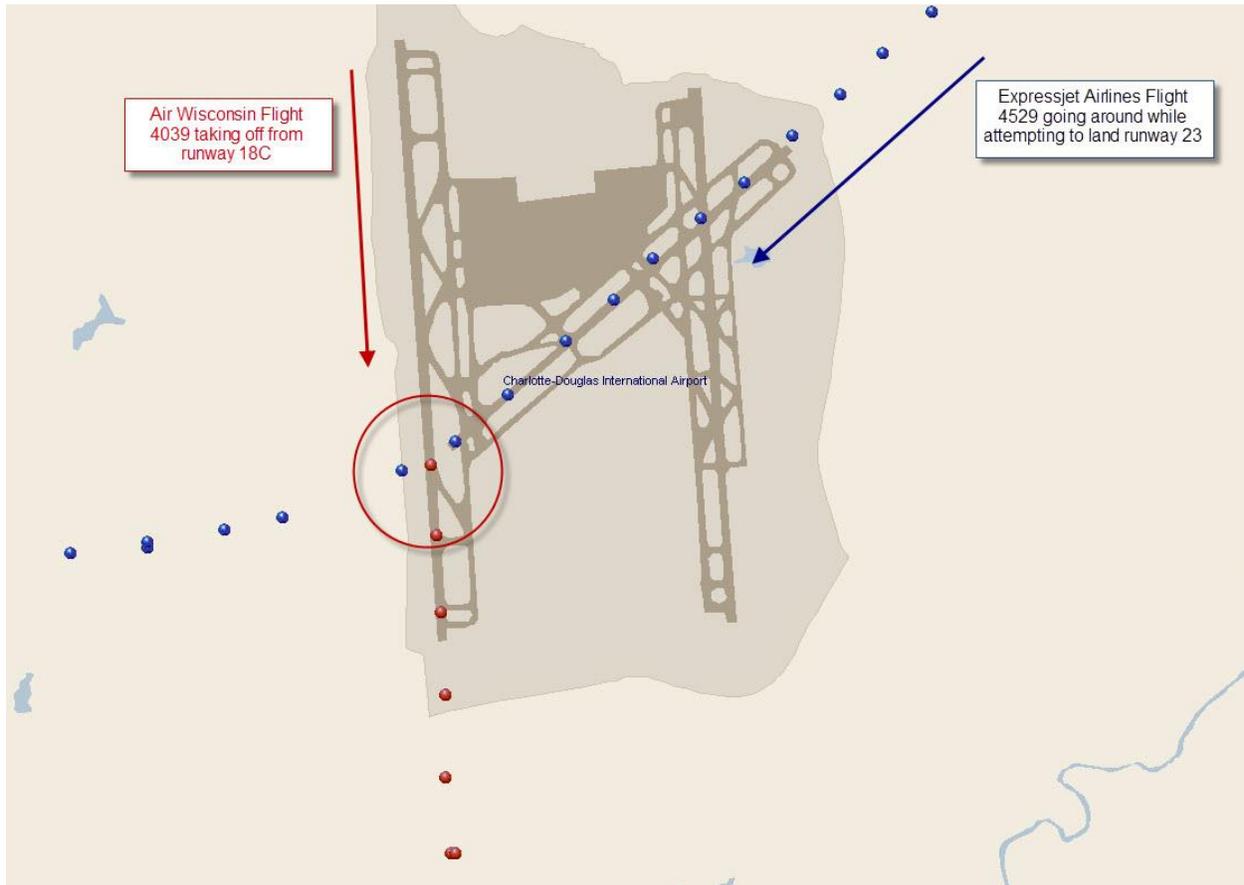


Figure 4. Expressjet flight 4529 (blue dots) executed a go-around while attempting to land on runway 23. Air Wisconsin flight 4039 (red dots) was simultaneously cleared for takeoff from runway 18C.

Jet Blue Flight 483 and a Bombardier Learjet 60, Las Vegas, Nevada

On April 26, 2012, about 1825 UTC, two airplanes came within hazardous proximity of one another at LAS when Jet Blue flight 483, an Airbus Industries A320, executed a go-around while attempting to land on runway 25L and XARAV, a Mexican-registered Bombardier Learjet 60, was departing from runway 19L (see figure 5).³ Runway 19L does not intersect runway 25L; however, the flightpath of runway 19L intersects the flightpath of runway 25L. Both pilots were communicating with separate LAS ATC controllers operating on different frequencies. During the go-around, Jet Blue flight 483 turned left to avoid XARAV. The pilot of XARAV saw Jet Blue flight 483 approaching from his left and initiated a rapid climb in an attempt to establish and maintain vertical separation. Review of recorded radar data for XARAV showed that the airplane's climb rate was as high as 6,000 feet per minute immediately after

³ More information about this event, NTSB case number OPS12IA535, can be found online at <http://www.nts.gov/aviationquery/index.aspx>.

departure. In radio transmissions from the pilot, the airplane's stick shaker⁴ can be heard in the background, warning the pilot of an imminent aerodynamic stall. The only separation instruction that ATC issued to XARAV was for the pilot to "go low," but by the time the instruction was issued, the airplane was climbing at a high rate and the pilot was unable to comply. The two airplanes' closest proximity was 0.30 nm laterally and 100 feet vertically. There were no injuries reported to passengers or flight crew and no damage reported to either airplane.

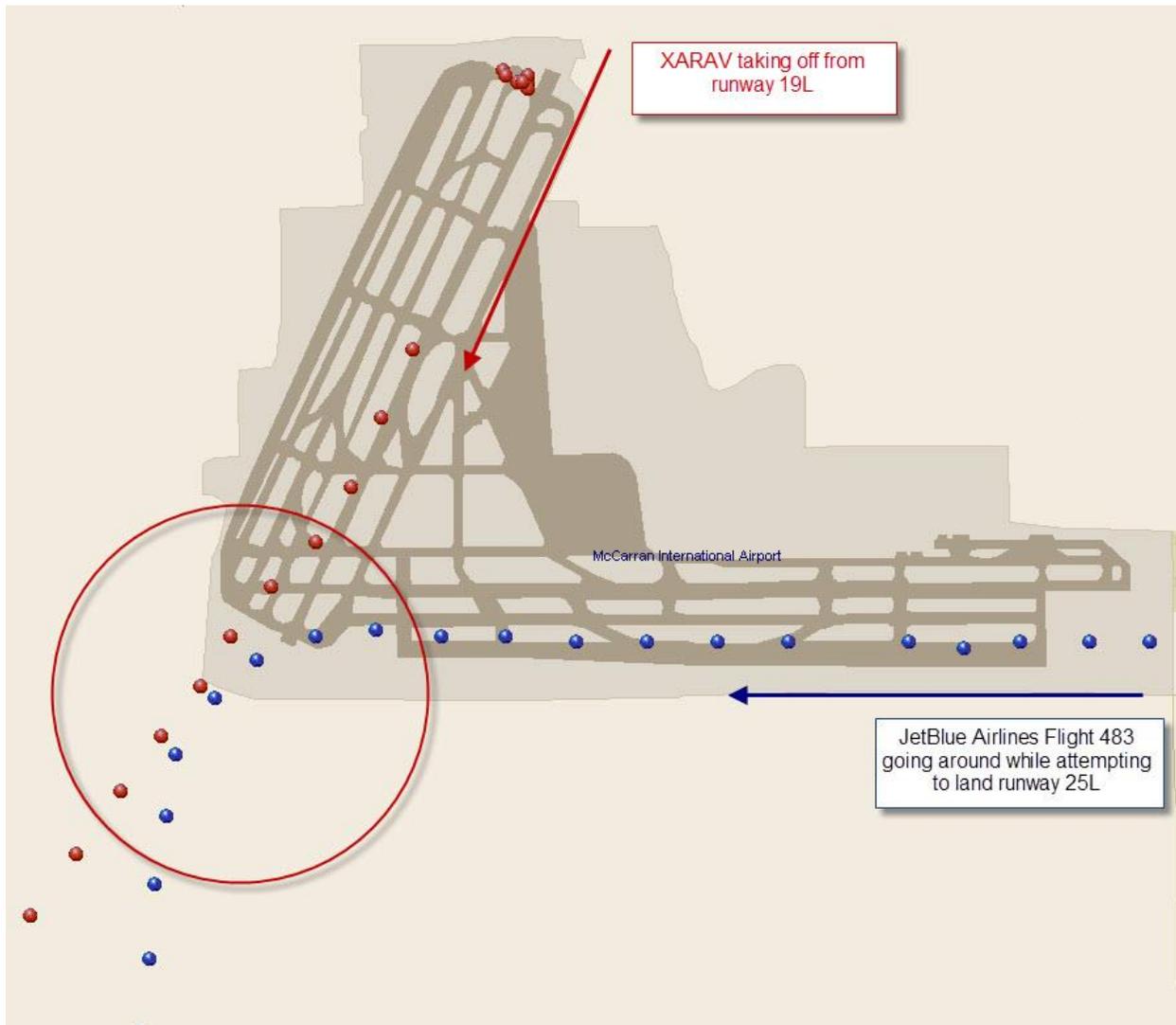


Figure 5. Jet Blue flight 483 (blue dots) executed a go-around from runway 25L. XARAV (red dots) was simultaneously departing from runway 19L.

United Airlines Flight 1547 and American Airlines Flight 1913, Las Vegas, Nevada

On January 27, 2006, about 0044 UTC, a near mid-air collision occurred at LAS when United Airlines flight 1547, an Airbus Industries A320, was attempting to land on runway 19R

⁴ The stick shaker vigorously rattles the flight crew's control yokes, providing a tactile indication that an aerodynamic stall may be imminent.

but was instructed to go around by ATC to prevent a conflict with a Beechcraft BE200 crossing the runway. During the go-around, United Airlines flight 1547 nearly collided with American Airlines flight 1913, a Boeing 757 that was departing from runway 25R (see figure 6).⁵ Runway 19L did not intersect runway 25R; however, the flightpath of runway 19L intersected the flightpath of runway 25R. Both airplanes were in communication with separate LAS ATC tower controllers operating on different frequencies. When the controller handling United Airlines flight 1547 became aware of the conflict, he issued a safety alert to the pilot about the conflicting departure and instructed the pilot to "...turn at your discretion." During a postincident interview, the controller stated that he did not issue a specific direction to turn because wake turbulence separation rules did not permit him to have the Airbus A320 turn left immediately behind the departing Boeing 757, and a right turn might have been too slow as well as rendering the United Airlines flight 1547 flight crew unable to see the conflicting departure. The controller stated that he "...wanted the pilot-in-command to decide what to do." United Airlines flight 1547 made an evasive turn to the right to avoid a potential collision, reportedly banking as much as 40 degrees to avoid crossing American Airlines flight 1913's flightpath. American Airlines flight 1913 made a slight left turn and was instructed by the controller to "stay low." United Airlines flight 1547 returned for landing, and American Airlines flight 1913 continued to its destination. There were no injuries reported to passengers or flight crew and no damage reported to either airplane. In postincident statements, the United Airlines flight 1547 flight crewmembers stated that the tower controllers did not seem to have clear procedures for separating aircraft in the event of a go-around and may not have had the same perception of an impending collision that they did.

⁵ More information about this event, NTSB case number OPS06IA004A/B, can be found online at <http://www.nts.gov/aviationquery/index.aspx>.

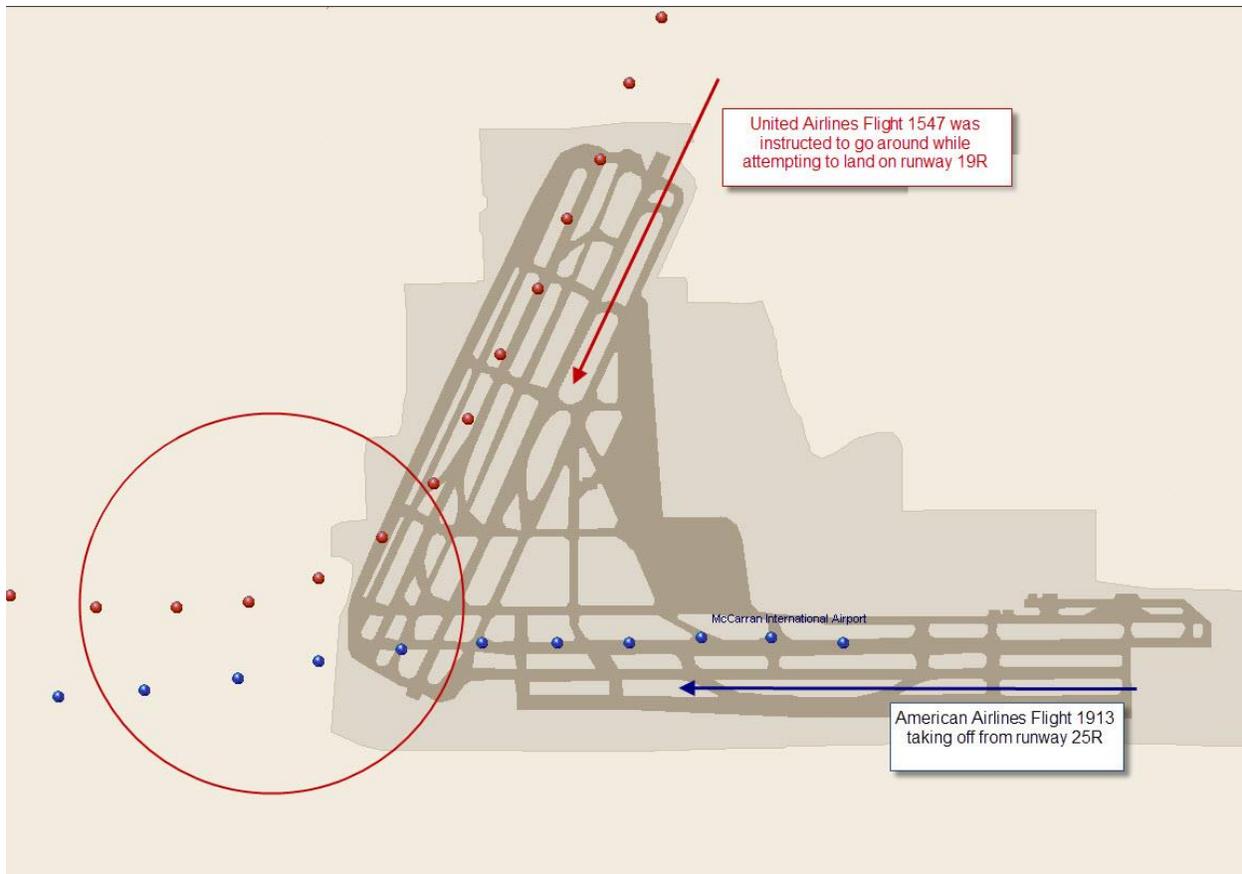


Figure 6. United Airlines flight 1547 (red dots) executed a go-around while attempting to land on runway 19R. American Airlines flight 1913 (blue dots) was simultaneously cleared for takeoff from runway 25R.

Discussion

FAA Order 7110.65, “Air Traffic Control,” contains specific requirements for ensuring separation between two aircraft that are departing from runways that do not physically touch but have intersecting flightpaths. Paragraph 3-9-8, “Intersecting Runway Separation,” requires controllers to do the following:

Separate departing aircraft from an aircraft using an intersecting runway, or nonintersecting runways when the flight paths intersect, by ensuring that the departure does not begin takeoff roll until one of the following exists: 1. The preceding aircraft has departed and passed the intersection, has crossed the departure runway, or is turning to avert any conflict. 2. A preceding arriving aircraft is clear of the landing runway, completed the landing roll and will hold short of the intersection, passed the intersection, or has crossed over the departure runway.

Further, the same paragraph requires that the following aircraft have a minimum 2-minute interval before passing through the airborne flightpath of a heavy jet or Boeing 757 operating on another runway. The separation standards established by paragraph 3-9-8 require that potential

conflicts be resolved as part of the tower controller's initial decision on when to issue takeoff clearances to two departing aircraft. However, the NTSB notes that there is no requirement for controllers to provide the same protections for the potential go-around flightpath of a landing aircraft even though, in the event of a go-around, the arriving aircraft effectively becomes a departure. Conflicts such as those described in this letter would have been clear violations of FAA safety and separation standards had the scenarios involved two aircraft departing the airport rather than one arrival and one departure. There appears to be no safety justification for treating the situations differently.

As shown by the events described in this letter, although a particular set of runways does not intersect on the ground, the assumption cannot be made that potential conflicts will not occur in the vicinity of the airport. When the pilot of a landing aircraft executes a go-around maneuver, as in the examples provided, air traffic controllers may be left with no viable options to ensure that safe separation exists between the go-around aircraft and aircraft operating to or from converging runways. In these events, the ATC tower controllers attempted to use tower visual separation rules to ensure the aircraft did not collide at the point where the flightpaths intersected. The FAA's Pilot-Controller Glossary contains the following definition of visual separation:

VISUAL SEPARATION - A means employed by ATC to separate aircraft in terminal areas and en route airspace in the NAS [National Airspace System]. There are two ways to effect this separation:

- a. The tower controller sees the aircraft involved and issues instructions, as necessary, to ensure that the aircraft avoid each other.
- b. A pilot sees the other aircraft involved and upon instructions from the controller provides his/her own separation by maneuvering his/her aircraft as necessary to avoid it. This may involve following another aircraft or keeping it in sight until it is no longer a factor.

Because of the nature of the geometry of the encounters and the unexpected nature of the go-arounds, it was not possible for the ATC tower controllers to issue effective control instructions to ensure that the airplanes avoided each other. Therefore, visual separation procedures could not be successfully applied or asserted as an adequate means of resolving the conflicts. The NTSB is concerned that in these events, ATC was not able to ensure the safe separation of aircraft. Instead, separation was established by resorting to impromptu evasive maneuvers by pilots during critical phases of flight. The NTSB concludes that the lack of specific separation standards, similar to those defined in paragraph 3-9-8 of FAA Order 7110.65, "Air Traffic Control," applicable to departing aircraft and aircraft conducting a go-around from nonintersecting runways where flightpaths intersect, facilitates hazardous conflicts and introduces unnecessary collision risk.

Therefore, the National Transportation Safety Board makes the following recommendation to the Federal Aviation Administration:

Amend Federal Aviation Administration Order 7110.65, "Air Traffic Control," to establish separation standards similar to the provisions of paragraph 3-9-8 between an arriving aircraft that goes around and any combination of arriving or departing aircraft operating on runways where flightpaths may intersect. (A-13-024)

Chairman HERSMAN, Vice Chairman HART, and Members SUMWALT, ROSEKIND, and WEENER concurred in this recommendation.

The NTSB is vitally interested in this recommendation because it is designed to prevent accidents and save lives. We would appreciate receiving a response from you within 90 days detailing the actions you have taken or intend to take to implement it. When replying, please refer to the safety recommendation by number. We encourage you to submit your response electronically to correspondence@ntsb.gov.

[Original Signed]

By: Deborah A.P. Hersman,
Chairman