National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation Report

Educating Controllers on Two Midair Collisions

Accident Numbers:	ERA15MA259A/B; WPR15MA243A/B
Operator/Flight Number:	Multiple
Aircraft and Registration:	Cessna 150M (N3601V) and Lockheed Martin F-16CM; Cessna 172M (N1285U) and North American Rockwell Sabreliner NA265-60SC (N442RM)
Location:	Moncks Corner, SC; San Diego, CA
Date:	July 7, 2015; August 16, 2015
Adopted:	November 14, 2016

The National Transportation Safety Board (NTSB) is providing the following information to urge the Federal Aviation Administration (FAA) and Midwest Air Traffic Control, Robinson Aviation, and Serco (companies that operate federal contract towers) to take action on the safety recommendations in this report. These recommendations address educating air traffic controllers on the circumstances of the July 7, 2015, and August 16, 2015, midair collisions in which the air traffic controllers made judgment errors that led to the collisions. As a result of these investigations, the NTSB is issuing two safety recommendations each to the FAA, Midwest Air Traffic Control, Robinson Aviation, and Serco.

Accidents

July 7, 2015, Moncks Corner, South Carolina

On July 7, 2015, about 1101 eastern daylight time, a Cessna 150M, N3601V, and a Lockheed Martin F-16CM, operated by the US Air Force, collided in midair near Moncks Corner, South Carolina.[1] The private pilot and passenger aboard the Cessna died, and the Cessna was destroyed during the collision. The damaged F-16 continued to fly for about 2 1/2 minutes, during which the pilot activated the airplane's ejection system. The F-16 pilot landed safely using a parachute and incurred minor injuries, and the F-16 was destroyed after its subsequent collision with terrain and postimpact fire. Visual meteorological conditions (VMC)

[1] More information about this accident, NTSB case number ERA15MA259A/B, can be found in the Aviation Accident Database at www.ntsb.gov.

prevailed at the time of the accident. No flight plan was filed for the Cessna, which departed from Berkeley County Airport (MKS), Moncks Corner, South Carolina, about 1057, and was destined for Grand Strand Airport, North Myrtle Beach, South Carolina. The personal flight was conducted under the provisions of 14 *Code of Federal Regulations* (*CFR*) Part 91. The F-16 was operating on an instrument flight rules flight plan and had departed from Shaw Air Force Base, Sumter, South Carolina, about 1020.

The pilot of the F-16 was in contact with air traffic control (ATC) and was provided radar vectors for a practice instrument approach to Charleston Air Force Base/International Airport, Charleston, South Carolina; the F-16 descended to an altitude of about 1,600 ft mean sea level as instructed by the air traffic controller. Shortly thereafter, the Cessna departed under visual flight rules from MKS; the Cessna pilot was not in contact with ATC, nor was he required to be, and had not requested traffic advisory (flight-following) services. As the Cessna continued its departure climb, the airplanes converged to within about 3.5 nautical miles (nm) laterally and 400 ft vertically, triggering a conflict alert on the controller's radar display and an aural alarm. About 3 seconds later, the air traffic controller issued a traffic advisory notifying the F-16 pilot of the position, distance, and indicated altitude of the radar target that corresponded to the Cessna, stating that the aircraft type was unknown. When the F-16 pilot replied that he was looking for the traffic, the controller issued a conditional instruction to the F-16 pilot to turn left if he did not see the airplane. The F-16 pilot did not see the airplane and responded, asking "confirm two miles?" The controller responded, "if you don't have that traffic in sight turn left heading 180 immediately." As the controller began this transmission, the F-16 pilot initiated a standard rate (approximately) left turn using the autopilot so that he could continue to visually search for the traffic; however, the airplanes continued to converge and eventually collided about 40 seconds after the controller's traffic advisory notifying the F-16 pilot of traffic. The NTSB determined that the probable cause of this accident was the approach controller's failure to provide an appropriate resolution to the conflict between the F-16 and the Cessna.[2]

August 16, 2015, San Diego, California

On August 16, 2015, about 1103 Pacific daylight time, a Cessna 172M, N1285U, and an experimental North American Rockwell NA265-60SC Sabreliner, N442RM (call sign Eagle1), collided in midair about 1 mile northeast of Brown Field Municipal Airport (SDM), San Diego, California.[3] The pilot (and sole occupant) of N1285U and the two pilots and two mission specialists aboard Eagle1 died; both airplanes were destroyed. N1285U was registered to a private individual and operated by Plus One Flyers under the provisions of 14 *CFR* Part 91 as a personal flight. Eagle1 was registered to and operated by BAE Systems Technology Solutions & Services, Inc., for the US Department of Defense as a public aircraft in support of the US Navy. No flight plan was filed for N1285U, which originated from Montgomery-Gibbs Executive Airport, San Diego, California. A mission flight plan was filed for Eagle1, which

[2] Contributing to the accident were the inherent limitations of the see-and-avoid concept, resulting in both pilots' inability to take evasive action in time to avert the collision.

[3] More information about this accident, NTSB case number WPR15MA243A/B, can be found in the Aviation Accident Database at www.ntsb.gov.

originated from SDM about 0830 and was returning to SDM. VMC prevailed at the time of the accident.

About 1 minute before the collision, the Eagle1 flight crew reported on downwind midfield and stated that they had traffic to the left and right in sight. At that time, N1285U was to Eagle1's right, between Eagle1 and the tower, established on a right downwind about 500 ft below Eagle1's position. N6ZP was about 1 mile forward and to the left of Eagle1, heading northeast and departing the area. Mistakenly identifying the Cessna to the right of Eagle1 as N6ZP, the local controller instructed the N6ZP pilot to make a right 360˚ turn to rejoin the downwind when, in fact, N1285U was the airplane to the right of Eagle1. The N6ZP pilot acknowledged the local controller's instruction and began turning; N1285U continued its approach to runway 26R. However, the local controller never visually confirmed that the Cessna to Eagle1's right (N1285U) was making the 360˚ turn. Ten seconds later, the local controller instructed the Eagle1 flight crew to turn base and land on runway 26R, which put the accident airplanes on a collision course. The local controller looked to ensure that Eagle1 was turning as instructed and noticed that the Cessna on the right downwind (which he still mistakenly identified as N6ZP) had not begun the 360˚ turn that he had issued. The local controller called the N6ZP pilot, and the pilot responded that he was turning. The local controller transmitted the call sign of N1285U, which the pilot acknowledged. N1285U and Eagle1 collided as the local controller tried to verify N1285U's position. The NTSB determined that the probable cause of this accident was the local controller's failure to properly identify the aircraft in the pattern and to ensure control instructions provided to the intended Cessna on downwind were being performed before turning Eagle1 into its path for landing. Contributing to the local controller's actions was his incomplete situational awareness when he took over communications from the local control trainee due to the high workload at the time of the accident.[4]

Discussion

The primary purpose of the ATC system is, in part, to prevent a collision between aircraft operating in the system and to provide a safe, orderly, and expeditious flow of traffic. FAA Order 7110.65, *Air Traffic Control*, paragraph 2-1-2, "Duty Priority," states, in part, that controllers should "give first priority to separating aircraft and issuing safety alerts as required in this order. Good judgment must be used in prioritizing all other provisions of this order based on the requirements of the situation at hand." Because there are many variables involved, it is virtually impossible to develop a standard list of duty priorities that would apply uniformly to every conceivable situation. Each set of circumstances must be evaluated on its own merit, and when more than one action is required, controllers must exercise their best judgment based on the facts and circumstances known to them. According to FAA Order 7110.65, "That action which is most critical from a safety standpoint is performed first."

In both of these midair collisions, the controllers were experienced; however, they made judgment errors that, if resolved early in the accident sequence when the conflicts were first detected, could have prevented the accidents. In the Moncks Corner, South Carolina, accident,

[4] Contributing to the accident were the inherent limitations of the see-and-avoid concept, resulting in the inability of the pilots involved to take evasive action in time to avert the collision.

the controller made assumptions that ultimately limited her options. For instance, during postaccident interviews, the controller reported that when she observed the Cessna's target on her radar display as it departed, she assumed that the airplane would remain within its local traffic pattern, which was not the case. Therefore, it was not until the airplanes were within about 3.5 nm and 400 vertical ft of one another that the controller notified the F-16 pilot of the presence of the traffic by issuing the traffic advisory. In addition, the controller's expectation of the F-16 pilot's performance was based on her assumption that a fighter airplane would perform a high performance turn to the heading; however, this expectation of performance was not clearly communicated. Further, the controller judged her best final action to be to direct the F-16 to turn left, when other more conservative and safer options were available. Good judgment was at issue.

In the San Diego, California, midair collision, the local controller made several errors in judgment. His workload at the time was over his stated personal limit. To resolve the increasing workload, the local controller had two options. He could have directed traffic away from SDM or split the local control/ground control positions, but he did neither.[5] Further, the controller identified the potential conflict between the accident airplanes about 3 minutes before the accident. In attempting to resolve the conflict, the controller misidentified the accident Cessna and issued control instructions to the wrong airplane. Most importantly, the controller did not ensure that the Cessna to the right of Eagle1 was complying with the control instructions before issuing the turn instruction to Eagle1. Had he looked up to ensure that the control instructions that he provided to what he thought was the Cessna on Eagle1's right were being performed, he would have noticed that that Cessna was not turning and likely would not have issued the conflicting turn instruction to Eagle1. Controllers must use good judgment by ensuring that their instructions are complied with before issuing additional instructions. Further, when the controller saw that the airplanes were in unsafe proximity to each other, his priority should have been to separate the airplanes by issuing a safety alert to the Eagle1 flight crew; instead, he separately called each Cessna pilot to verify their call signs and positions.

Because the guidance contained in FAA Order 7110.65 is general, scenario-based training can provide controllers with specific examples to help them identify situations where good judgment is critical. The FAA's training guidance for controllers, contained in Joint Order 3120.4P, *Air Traffic Technical Training*, addresses controller judgment as it relates to assessing performance during on-the-job training. However, the foundation for good judgment can be developed in trainees, and reinforced in experienced controllers, indirectly using methods that include but are not limited to review of events and situations where controller judgment was exemplar or could be improved. We conclude that the information provided by the developing chain of events in these accidents provides an ideal opportunity to impart a lesson to the controller workforce on controller judgment without the risk of exposing the participants to a poor decision that may lead to adverse safety outcomes. While federal contract towers are required to include all FAA-required training, we want to highlight the importance of these issues to all controllers, both at FAA facilities and at federal contract towers, to ensure that they are all aware of the need for controller judgment, vigilance, and/or safety awareness training and briefings. Therefore, the NTSB recommends that the FAA, Midwest Air Traffic Control,

[5] The trainee was qualified to work the ground control position.

Robinson Aviation, and Serco include the July 7, 2015, and August 16, 2015, midair collisions as examples in their instructor-led initial and recurrent training for air traffic controllers on controller judgment, vigilance, and/or safety awareness. We recognize that incorporating changes to training programs may take time; we conclude that a briefing for controllers would be a timely and effective way to make controllers aware of the ATC errors evident in these accidents. Therefore, the NTSB recommends that the FAA, Midwest Air Traffic Control, Robinson Aviation, and Serco brief all air traffic controllers and their supervisors on the ATC errors in the July 7, 2015, and August 16, 2015, midair collisions.

Recommendations

To the Federal Aviation Administration, Midwest Air Traffic Control, Robinson Aviation, and Serco:

Include the July 7, 2015, and August 16, 2015, midair collisions as examples in your instructor-led initial and recurrent training for air traffic controllers on controller judgment, vigilance, and/or safety awareness. (A-16-51)

Brief all air traffic controllers and their supervisors on the air traffic control errors in the July 7, 2015, and August 16, 2015, midair collisions. (A-16-52)