

1092448



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: February 14, 1994

In reply refer to: A-94-6 through -8

Honorable David R. Hinson
Administrator
Federal Aviation Administration
Washington, D.C. 20591

On November 24, 1992, about 2215 eastern standard time, N728T, a Gulfstream 2 turbojet airplane, experienced a complete electrical failure while flying above a solid overcast at night, south of Washington, D.C. Although the airplane eventually landed successfully at National Airport, several events occurred that jeopardized safety while air traffic control (ATC) was attempting to assist the airplane.

The flight had departed from Fort Lauderdale, Florida, and was en route to Rockland, Maine. When the electrical failure occurred, the flight was in Washington Air Route Traffic Control Center (ARTCC) airspace, at flight level (FL) 410. Just after the loss of both generators, the pilot advised Washington ARTCC controllers of his electrical problem, and requested a radar vector to Dulles Airport. However, he lost all communications and radio navigation capability before the vector was issued.

The pilot later told investigators, "There was a solid layer of clouds beneath us as far as we could see in all directions." He also reported that the airplane's magnetic compass, illuminated by the other pilot aboard holding a flashlight, was his only means of determining direction of flight. A small, independent battery was powering the standby attitude indicator. Not being able to descend in visual meteorological conditions, the pilots decided to descend toward the glow of the lights of Washington, D.C., below the overcast. They entered the overcast condition at an altitude of 10,000 to 12,000 feet. As they approached 1,500 feet without breaking out of the overcast, the pilot did not want to go any lower, but his options were severely limited. He expressed his concern that if he had climbed to a safer altitude in the clouds, the emergency battery power for the standby attitude indicator might have quit, and thus he "had nowhere else to go." Therefore, he continued to descend, and broke out of the overcast, west-northwest of the city at about 1,000 feet.

The pilots sighted the Washington Monument, gained their bearings, and continued to the south of Washington National Airport, where they determined that traffic was landing towards them. They then turned northwest, east, and then south, and began a final approach to the airport. They lowered the landing gear by using the emergency extension system. Because the flaps could not be lowered, they used a greater than normal approach speed of 145 knots. After touching down and discovering that they had no brakes, the pilots used the emergency brake, which did not respond until it was "full on." As the aircraft came to a stop, the four main tires burst. There were no injuries to the occupants.

Although this mishap was not classified as an accident, an operational error, or a pilot deviation, the Board's interest is centered around several occurrences in which ATC compromised safety. Unknown to the pilots, as soon as Washington ARTCC controllers learned that the electrical system was failing, they began coordinating with controllers at National Tower and Dulles Tower, who in turn began coordinating with controllers at the nearby Andrews Air Force Base Tower. Because of the electrical failure, the transponder-reinforced beacon return for ATC radar was unavailable. Air traffic controllers had to rely on the airplane's primary radar return to determine the aircraft's position. Washington Approach Control was given permission to use airspace normally controlled by Washington ARTCC. ATC personnel from Dulles Approach Control advised Washington Approach Control that they would "block" (reserve exclusively) airspace for the emergency airplane. The radar controller at Washington Approach Control transmitted on "Guard,"¹ advising N728T that Dulles Airport traffic was landing to the south and that if they would like to land at National Airport, the wind was calm, and traffic there was also landing to the south. The radar controller then tried to assure the pilot that National Airport was "getting airplanes out of the way." However, because the pilots had no emergency receiver capability, they did not hear any of the controller's transmissions.

After N728T's electrical failure, Washington Approach Control advised the pilot of USAir flight 1729, which was in Washington airspace at flight level 200, that he needed some help, that they had an airplane without an electrical system which he thought was above the cloud layer. The controller then asked the pilot of USAir 1729 to look at "10 o'clock and 15 miles," saying that there should be an aircraft heading northwest bound. "I know it'll be hard to see him. He has no electrical system, so he won't be lit up." The controller then said that the aircraft was 10 miles away and advised the pilot of USAir 1729, "If you turn left heading 180 it should get you kind of close to him." On the controller's

¹ Emergency frequency, 121.5 Mhz.

second attempt to have USAir 1729 pass close to N728T, the controller again advised, "He won't be lit up, so keep an eye out for him." The pilot of USAir 1729 replied that he saw an aircraft, and it "looks like he's above us. There's a strobe over in that direction, a lot of clouds." The controller then said the aircraft was last reported at FL 230, and "that could be him." The pilot of USAir 1729 replied that he couldn't tell which way the aircraft was turning, but that he would head "towards him, looks like he's above us." The controller then pointed the aircraft out at 12 o'clock and 3 miles. The pilot of USAir 1729 said, "yea, he's coming toward us. I'm going to turn the lights on so he can see me." The controller replied, "Yea, light up for him. He's 12 o'clock and about 2 miles, now." A few seconds later the controller told the pilot that they had passed each other. The controller then thanked the crew of USAir 1729 for helping, and said, "turn right, direct Gordonsville." The controller then tried to assist the pilot of N728T by contacting two other airplanes in the vicinity: N8EA, a Cheyenne, and a Navy AJ06. At one point the controller transmitted to N728T, "if you can hear us on guard frequency, you got another aircraft, a Cheyenne out there, he's looking for ya, if we can, ah, get you two paired up, he'll help lead you in." Navy AJ06 was on a heading of 270°, looking for N728T when the controller transmitted, "looks like he made it down through the clouds, he's on a final for National."

The Safety Board believes that, even in an emergency, it is not safe to decrease ATC separation standards between two aircraft to provide assistance to one of them. Because N728T was not transmitting a Mode C transponder signal, it could not be determined if any separation criteria were actually compromised. However, the Board believes that separation may have been compromised, considering both the lack of current altitude information for the emergency aircraft and traffic callouts such as, "He's at 12 o'clock and about 2 miles, now." The aircraft could have been at the same altitude, and consequently, the threat of a midair collision was very real.² The Board believes that Air Traffic Control handbook 7110.65 addresses standard separation adequately. Regarding emergencies, Chapter 10 states that the controller is to "select and pursue a course of action which appears to be most appropriate under the circumstances and which most nearly conforms to the instructions in this manual." Thus, this section allows a certain latitude that the Board believes is necessary. Because Chapter 10 does not address the subject of aircraft join-ups, the controller, in this case, was allowed to compromise separation standards. For that reason, ATC personnel should not be criticized for their performance. Considerable effort was exerted in trying to assist N728T, and fortunately, the

² Approach Control minimum separation is 3 miles horizontally or 1,000 feet vertically.

outcome of this incident was not adversely affected. However, had Chapter 10 contained specific information regarding join-ups for emergency purposes, the Board believes that the controller's actions would have been different and safety might not have been compromised.

ATC emergency procedures should prohibit controllers from placing any aircraft at less than standard separation from another, even when providing guidance and assistance to aircraft in distress. For situations that involve specially equipped Search and Rescue (SAR) aircraft and air defense interceptor aircraft flown by specially trained flightcrews, Chapter 10, paragraph 74, of the Air Traffic Control handbook directs the controller to "provide standard IFR [instrument flight rules] separation between the search and rescue aircraft and the aircraft in distress, except that when visual or radar contact has been established by the search and rescue aircraft,³ and the pilots of both aircraft concur, IFR separation may be discontinued." The Board believes this to be a valid concept, but that it should be extended to include all aircraft, not simply SAR aircraft, and that this should be explicitly stated in Chapter 10.

Join-ups can be accomplished with the standard horizontal separation of 3 or 5 miles, and if closer horizontal separation distances are needed, 1 or 2 thousand feet of altitude separation would enable the horizontal separation to be decreased until one aircraft sights the other. Because the altitude of N728T was unknown, the controller should not have vectored the air carrier aircraft closer than 3 miles horizontally. The Board believes that Air Traffic Control handbook 7110.65, Chapter 10, "Emergencies," should be amended to specify that, in any emergency situation, if any aircraft, not only designated SAR aircraft, needs to get closer than approved radar separation allows, then the separation should be accomplished visually, after the pilots have sighted each other, and not as was attempted in this incident.

After pilots have sighted each other visually, and IFR separation can be discontinued, ATC personnel should realize the dangers of even a suggestion that one aircraft follow another through a solid overcast condition. In dense cloud conditions, such as those that existed on the night of this incident, the visibility in clouds can be restricted to the extent that the fuselage of the other aircraft is barely visible, sometimes requiring overlap of the wings to remain close enough to maintain sight of the other aircraft. Additionally, a "downwash" problem exists that could result in a roll of one aircraft into the other or the loss of control of the trailing airplane. The Board views aircraft following one another through solid overcast conditions as

³ via special airborne radar for tracking other aircraft.

being extremely hazardous, and, in fact, believes that it should never be considered as an emergency option, unless both pilots are experienced in formation flying, such as military pilots, when the pilots are qualified for and capable of formation flight, are familiar with each other's abilities, and can communicate with each other. This information should be included in the ATC Handbook, Chapter 10, "Emergencies," most likely in the format of the familiar "note," so that a formation descent through an overcast is never considered as an option for the resolution of a similar future emergency.

Although the flightcrew was unable either to transmit or to receive on their radios, the controller had evidence only that the airplane was unable to transmit. In this situation, he should have issued a heading change instruction to N728T and then observed on his radar display if the airplane responded, thereby determining positively its radio receiver status. Such controller action is called for in the Air Traffic Control handbook, Chapter 10, paragraph 43c. This paragraph tells the controller to attempt to reestablish communication by having the aircraft use its transponder or make turns to acknowledge clearances. Although the controller's failure to do so did not affect the outcome of this incident, it could have significantly enhanced his capability to assist the airplane had its receiver been operable. The Board believes that the FAA should issue an Air Traffic Bulletin for the mandatory briefing of all controllers, reminding them that in the event of a communications failure, coupled with the loss of the aircraft's transponder signal, there is a possibility that receiver capability still exists. In that situation controllers should instruct the pilot to make specific turns before treating the situation as a complete radio failure, in order to determine radio status.

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

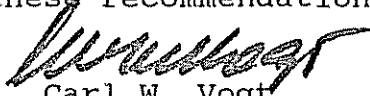
Revise Air Traffic Control handbook 7110.65, Chapter 10, "Emergencies," to include an explanation of the close formation flight that would be required to escort an aircraft through solid cloud formations. The revision should also explain that an escort through such conditions should never be considered for the resolution of an emergency unless the emergency involves pilots who are qualified for and capable of formation flight, are familiar with each other's abilities, can communicate with one another, and have visual or airborne radar contact with the other aircraft. (Class II, Priority Action) (A-94-6)

Revise Air Traffic Control handbook 7110.65, Chapter 10, "Emergencies," to specify that in an emergency situation,

if there is a need for any two aircraft, not just designated search and rescue aircraft, to get closer to one another than radar separation standards allow, that such maneuvers be accomplished visually, after the pilots have sighted each other. It should be explained that altitude separation can be used to get aircraft within 1 or 2 thousand feet of each other if necessary for join-up purposes, and that this normal separation criteria should never be compromised, even in an emergency. (Class II, Priority Action) (A-94-7).

Issue an Air Traffic Bulletin directing a mandatory briefing of all controllers, reminding them that in the event of a communications failure, coupled with the loss of an aircraft's transponder signal, there is a possibility that receiver capability still exists, and that controllers should instruct the pilot to make specific turns before treating the situation as a complete radio failure. (Class II, Priority Action) (A-94-8)

Chairman VOGT, Vice Chairman COUGHLIN, and Members LAUBER, HAMMERSCHMIDT, and HALL concurred in these recommendations.


By: Carl W. Vogt
Chairman