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# NATIONAL TRANSPORTATION SAFETY BOARD WASHINGTON, D.C.

ISSUED: March 24, 1983

Forwarded to:

Honorable J. Lynn Helms  
Administrator  
Federal Aviation Administration  
Washington, D.C. 20591

SAFETY RECOMMENDATION(S)

A-83-27 through -30

About 1015 e.s.t, on December 28, 1982, a Piedmont Airlines Boeing 737-200, operating as Piedmont Airlines (PI) Flight 200, was reported by numerous ground witnesses to have flown dangerously close to one of several tall buildings which reaches an elevation of 396 feet m.s.l. 1/ located at 1000 Wilson Boulevard in Rosslyn, Virginia. At the time, the flight was executing a VOR/DME 2/ instrument approach to runway 18 at Washington National Airport.

The runway 18 VOR/DME approach is a nonprecision approach in that no vertical descent path electronic reference is provided to the pilot. Approach altitudes, however, are regulated by the approach chart which depicts a series of stepdown descents from an altitude of 3,000 feet at the 10-mile DME fix down to 900 feet at the 3-mile DME fix. After the pilot has crossed the 3-mile DME fix, he can then descend the airplane to 720 feet, the minimum descent altitude (MDA) prescribed for the approach. The MDA of 720 feet must be maintained until at least one of the prescribed visual references for the runway of intended landing is distinctly visible and identifiable to the pilot and the airplane can be descended visually at a normal rate. A missed approach must be executed if the pilot fails to acquire the necessary visual reference at the MDA.

The readout of the flight data recorder (FDR) from PI Flight 200 indicated that the airplane might have crossed the 3-mile DME fix as low as 517 feet, which is 383 feet lower than the prescribed crossing altitude and about 200 feet lower than the MDA of 720 feet. The FDR indicated that the flight continued its descent and passed abeam the building in Rosslyn at about 400 feet m.s.l. In addition, the airplane drifted to the right of the inbound course, placing it nearer the building than normally should occur; the prescribed inbound course passes about 500 feet east of the building.

1/ m.s.l. - Mean Sea Level - all altitudes will be mean sea level unless noted.

2/ VOR - Very High Frequency Omnidirection Range Station - a ground-based electronic navigation aid transmitting very high frequency navigation signals, 360° in azimuth, oriented from magnetic north.

DME - Distance Measuring Equipment - equipment (airborne and ground) used to measure, in nautical miles, the slant range distance of an aircraft from the DME navigational aid.

The investigation revealed that while PI Flight 200 might have come closer to the building than most airplanes, the occurrence of low flying airplanes over this section of Rosslyn is not unusual. Two witnesses indicated that they had observed three other low flying air carrier airplanes about the time they observed PI Flight 200. During interviews, witnesses indicated that they have observed low flying air carrier airplanes over the past 2 years, during periods of low ceilings.

Because the high incidence of low flying airplanes may be caused by the peculiarities of this approach, the Safety Board evaluated the VOR/DME runway 18 approach, the LDA 3/ runway 18 approach, and the Visual River Approach. The LDA runway 18 approach has an inbound course of 147° and crosses the center of Rosslyn approximately 2,100 feet farther west than the centerline of the VOR/DME 18 inbound course. The LDA runway 18 approach provides electronic glideslope guidance from 3,000 feet at the 9-mile DME fix down to the prescribed MDA of 1,100 feet at the 3.5-mile DME fix. The glideslope cannot be used below 1,100 feet. The LDA approach chart depicts flight over the river beginning at the 3.5-mile DME fix similar to the manner in which flight is depicted in the latter portion of the Visual River Approach. In addition, instructions state: "Fly visual to the airport." No such depiction or instructions are found on the VOR/DME 18 approach charts, thereby implying that a pilot must maintain the inbound course until his airplane is at a point where it can descend on an approximate 3° glideslope to the runway touchdown point. However, the inbound course is not aligned with runway 18, and in order for a pilot to align his airplane with the runway, he is required to maneuver his airplane to the left over the river and then back to the right. Because of the need to maneuver the airplane, a majority of airline pilots who were questioned about the VOR/DME 18 approach stated that once they became visual (clear of clouds), they preferred to maneuver the airplane over the river and fly the latter portion of the Visual River Approach, as depicted on the LDA chart.

The Visual River Approach may be executed whenever the ceiling is at least 3,500 feet and the visibility is at least 3 miles. A flight requires radar vectoring to the final approach course before it is cleared for a Visual River Approach. When cleared for the Visual River Approach, a pilot may (1) visually follow the Potomac River to the airport, or (2) proceed via the DCA/VOR 326° radial (146° inbound), or (3) proceed via the LDA runway 18 approach to abeam the Georgetown Reservoir or the 4-mile DME, before visually following the river to the airport. Prescribed approach altitudes for the Visual River Approach are depicted in the profile section of the approach chart beginning with the 10-mile DME fix at 3,000 feet, crossing the 6-mile DME fix at Chain Bridge at 1,800 feet, and down to the 3-mile DME crossing altitude of 900 feet. After the airplane crosses the 3-mile DME, a pilot may descend on his own since no MDA is prescribed for this approach.

Although a pilot flying his airplane inbound on the VOR/DME 18 approach must cross the 3-mile DME fix before he is authorized to descend to the MDA of 720 feet, the Safety Board is concerned that some pilots may be beginning their descent when they are in visual conditions before they reach the position abeam the highest building if they perceive that they can establish an acceptable descent profile. In addition, the allowable tolerance of the airborne VOR instruments may result in an airplane going closer to the highest building than the approach course path.

3/ LDA — Localizer Type Directional Aid — a NAVAID used for nonprecision instrument approaches with utility and accuracy comparable to a localizer but which is not a part of a complete Instrument Landing System (ILS) and is not aligned with the runway.

The Safety Board believes that a practical way of eliminating premature descents is to add a visual descent point (VDP) requirement to the VOR/DME 18 Approach. A VDP determined by a DME fix would require the pilot to maintain the MDA until the point is reached where a normal (approximately 3°) descent would be commenced. A VDP at Washington National Airport would intersect the 720-foot MDA approximately 1,800 feet inbound from a point abeam the highest building in Rosslyn.

The Safety Board also believes that the LDA approach course should be realigned so that an airplane would come in over the river or closer to the river than is presently required and that glideslope guidance should be provided down to a decision height near 500 feet or the lowest descent altitude that TERPS criteria will permit.

During its investigation, the Safety Board discovered that personnel working at the National Airport Tower/Approach Control Facility are aware that the minimum safe altitude warning (MSAW) is unreliable. The ARTS-3 computer has a program that disables the MSAW when it receives a "low quality" beacon return from any airplane. Although this apparently happens randomly as a result of reflection signals from the buildings in Rosslyn and the location of the ARTS antenna, the frequency of the occurrences could not be determined. A typical comment of the controllers was "when it really gets bad we call the Airways Facilities people and they 'tweak' it up. It then becomes more reliable." The controllers indicated that this was a long-standing weakness in the low altitude alert system at National Airport. As a result, the MSAW system might not alert National Airport's tower personnel of an approaching airplane's excursion at a most critical time.

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

Realign the LDA runway 18 approach course from 147° to 153° or even closer to the Potomac River if possible and provide glideslope guidance down to the lowest altitude allowable by TERPS criteria. (Class II, Priority Action) (A-83-27)

Add a visual descent point (VDP) to the VOR/DME runway 18 approach, located at a point where the VASI glideslope intersects the MDA or where a 3° descent angle to the touchdown point intersects the MDA. (Class I, Urgent Action) (A-83-28)

Amend the VOR/DME 18 approach chart to depict a transition to visual flight over the Potomac River similar to that depicted on the current LDA 18 approach chart and include an advisory to the effect that:

After obtaining visual reference to the runway, but no sooner than the final approach fix (FAF), transition to visual flight over the Potomac River. Maintain Minimum Descent Altitude until the visual descent point.

(Class II, Priority Action) (A-83-29)

Move the ARTS-3 antenna array to a site where it will provide more reliable operation of the minimum safe altitude warning (MSAW) system. (Class II, Priority Action) (A-83-30)

BURNETT, Chairman, GOLDMAN, Vice Chairman, McADAMS, BURSLEY, and ENGEN, Members, concurred in these recommendations.

  
By: Jim Burnett  
Chairman