

Log 2141



# National Transportation Safety Board

Washington, D.C. 20594

## Safety Recommendation

Date: April 10, 1989

In reply refer to: A-89-18 through 21

Mr. Robert E. Whittington  
Acting Administrator  
Federal Aviation Administration  
Washington, DC 20591

On November 16, 1987, at 0819 hours,<sup>1/</sup> a Beech B200 (a King Air series airplane), Serial Number BB-1188, N334DP, operated by DANPAR Aviation, Danbury, Connecticut, crashed near Jefferson, Wisconsin, while conducting an instrument flight rules corporate flight to Baraboo, Wisconsin. The flight had departed Meigs Field (CGX), Chicago, Illinois, at 0751. All eight occupants, including the two certificated commercial pilots, were killed.

After departing CGX, the flight climbed to 12,000 feet<sup>2/</sup> and proceeded along its previously cleared route. At 0815:05, the nonflying pilot requested a lower altitude; the sector controller at Chicago Air Route Traffic Control Center cleared the flight to descend and maintain 9,000 feet. At 0816:36, the flying pilot transmitted, "Three four delta pops got a Mayday, Mayday." There were no further communications from N334DP. The left wing had separated in flight and was found about 1 mile from the main crash site.

The available radar data revealed the airplane began its initial descent from 12,000 feet at 0815:22; the airplane descended about 1,200 feet per minute until it reached 10,800 feet. At 10,800 feet, the descent rate began to increase rapidly. The last radar-reported altitude was at 10,000 feet at 0816:35. The Madison (Wisconsin) approach controller reported that he continued to observe a primary target near the accident area until 0819.

The National Transportation Safety Board is continuing its investigation to determine the probable cause of the accident. The Safety Board has determined, however, that the size of the cross flow drain hole for N334DP did not comply with engineering production drawings.

The cross flow drain hole is located through a "C" channel and angle bracket which are at the bottom/center line of the fuselage, immediately aft of and attached to the aft pressure bulkhead. The cross flow drain hole allows accumulated moisture on the right side of the compartment to drain through the "C" channel to the left side of the compartment where an overboard drain exists.

<sup>1/</sup>All times are central standard time based on the 24-hour clock.

<sup>2/</sup>All altitudes, unless otherwise noted, are mean sea level altitudes.

The down elevator cable is located immediately to the right side of the "C" channel and near the bottom fuselage skin. If the cross flow drain hole is plugged, the water level may rise above the down elevator cable creating the potential for capturing the down elevator if the water should freeze.

The Safety Board is aware of several in-flight incidents where control column deflections were ineffective in moving the elevators because water accumulations at a blocked cross flow drain hole near the aft pressure bulkhead froze in flight and "captured" the elevator cables. Reports indicate that the airplanes were flown to lower altitudes where the cables were freed as the ice melted or were flown to landings with the use of pitch trim. Although the cables were captured by ice, the elevators were partially movable by using pitch trim (elevator trim tab).

Beech Aircraft Corporation engineering drawing 50-440014 defines the "C" channel, Part Number (P/N) 50-440014-595, the angle bracket P/N 50-440014-597, and the relative alignment of the two parts. At assembly, the alignment of the two parts should result in a cross flow drain hole with dimensions of 0.50 inch wide and 0.505 inch deep. Note AQ states:

This opening must not be obstructed by sealer or trash. The opening should be trimmed after assembly, if necessary, to conform to the blueprint dimensions for size of the opening.

Safety Board investigators found the "C" channel for N334DP and determined that the cross flow drain hole was less than 0.25 inch in diameter. The investigators inspected several other B200 airplanes, including three on the factory production lines. They found that diameters of the cross flow drain holes varied from 0.43 inch to less than 0.25 inch. Several of the cross flow drain holes were partially obstructed with epoxy sealant, which further diminished dimensions of the holes.

Examination of Production Inspection Reports revealed that Beech requires that the cross flow drain holes be inspected for obstructions; Beech does not require that the holes be checked for the proper dimensions.

In November 1977, Beech issued a Class II Service Instruction (SI), No. 0963, effective up to Serial No. BB-285. In part, the SI states:

At the forward end of the channel, locate the drainage hole that permits drainage from the RH side to the LH side. This hole is .25 inch in diameter and is through the channel just aft of its junction with the bulkhead. This hole should be free of obstructions.

The 0.25-inch dimension mentioned in SI No. 0963 above does not agree with the engineering drawing 50-440014 that defines the 0.5-inch by 0.505-inch cross flow drain hole.

Drawing 50-440014 delineates two aft fuselage skin assemblies, P/N 50-440014-505 and P/N 101-400010-5, that are effective for B200 series airplanes. Details of the -505 assembly drawing indicate that a 0.25-inch vertical drain hole into the ventral fin is required beneath the cross flow drain hole. The -5 assembly does not have a vertical drain hole requirement. Beech Engineering Change Order D10800 dated August 4, 1981, defines that the 101-400010-5 drawing be used for B200 series airplanes.

During inspections of B200 airplanes, Safety Board investigators also found that airplanes with serial Nos. BB-23, BB-684, BB-700, and BB-855 contained a vertical drain hole beneath the cross flow drain. Airplanes with serial Nos. BB-1038, BB-1188 (the accident airplane), BB-1134, BB-1194, BB-1311, and current production airplanes did not contain the vertical drain hole. The vertical drain hole allows the accumulated water to drain into the airplane's ventral fin, which has three atmospheric drain holes. Beech engineers could not explain, nor could they produce any documentation to explain, why some of the airplanes contained the vertical drain holes and the others did not. A review of the engineering change orders did not disclose any reason for this anomaly.

While the Safety Board cannot conclude that all B200 cross flow and vertical drain holes do not conform to the engineering production drawings, it is apparent that some airplanes do not conform. Therefore, the Safety Board believes that the Federal Aviation Administration (FAA) should review the quality control procedures used by Beech to ensure strict conformity to the engineering production drawings. Because numerous B200 series airplanes are already in service, the FAA also should issue an Airworthiness Directive (AD) requiring an immediate field inspection of the cross flow drain holes; the AD should include maintenance instructions for those airplanes that do not conform to the production drawings.

In addition, a placard (P/N 50-440101) mounted on the "C" channel states: "KEEP DRAIN HOLE OPEN." The arrow on the placard is intended to point to the cross flow drain hole about 1.5 inches away. However, because of the placement of the placard, the arrow also points at a tooling hole at the immediate edge of the placard. The Safety Board believes this placement may lead to confusion if pilots are required to inspect the area prior to the first flight of the day.

A review of the maintenance manual and various inspection sheets for the B200 series revealed that inspection of the aft fuselage cross flow drain area--which is noted as a critical area--is to be performed every 150 hours. The Pilot's Operating Handbook does not require the pilots to

inspect this area during their preflight inspections. The Safety Board believes that this critical area should be inspected before each flight. Access to the cross flow drain area is gained through the access door on the lower right side of the fuselage, aft of the aft pressure bulkhead. The door is secured with about 20 Dzus fastener screws and a key lock.

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

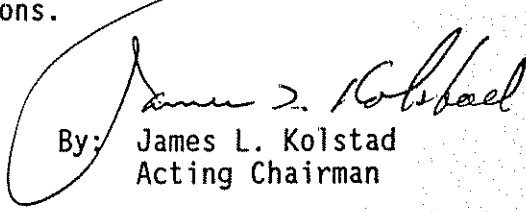
Reassess the design requirements and conformity of the cross flow drain holes to the specifications shown in Beech Aircraft Corporation engineering drawing 50-440014 for the Beech B200 and other King Air series airplanes with similar construction currently in production. (Class I, Urgent Action) (A-89-18)

Issue an airworthiness directive (AD) requiring an immediate field inspection of all Beech B200 and other King Air series airplanes with similar cross flow drain hole construction to ensure that the cross flow drain holes conform to dimensions in the engineering drawing 50-440014. The AD should include maintenance instructions for enlarging the hole or removing epoxy sealer in those airplanes that do not conform to the dimensions and should contain reporting requirements to the Federal Aviation Administration to ensure that all airplanes are inspected and that the scope of the nonconformity is defined. (Class I, Urgent Action) (A-89-19)

Until the adequacy of maintenance inspections at 150-hour intervals can be determined, require pilots to inspect the aft fuselage cross flow drain area of Beech B200 airplanes prior to the first flight of the day. The inspection should verify that the cross flow and other drain holes are unobstructed and should emphasize the potential for mistaking the tooling hole in the "C" channel for the cross flow drain hole. (Class I, Urgent Action) (A-89-20)

Require that the Federal Aviation Administration manufacturing inspectors conduct an inspection of Beech Aircraft Corporation quality control assurance procedures to verify adherence to specifications in engineering production drawings. The inspection should include a determination of whether the vertical drain hole in Beech B200 series airplanes provides an additional effective method for ensuring adequate water drainage. (Class II, Priority Action) (A-89-21)

KOLSTAD, Acting Chairman, and BURNETT, LAUBER, NALL, and DICKINSON, Members, concurred in these recommendations.

  
By: James L. Kolstad  
Acting Chairman