

File No. 3-0006

AIRCRAFT ACCIDENT REPORT

ROSS AVIATION, INC.

BEECRAFT 85-800, QUEEN AIR, N841NS

Albuquerque, New Mexico

May 19, 1972

Adopted: December 13, 1972

NATIONAL TRANSPORTATION SAFETY BOARD

Washington, D. C. 20591

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16. Abstract Ross Aviation, Inc., Flight 7 of May 19, 1972, a scheduled air taxi flight, crashed shortly after takeoff from Albuquerque International Airport, Albuquerque, New Mexico. The aircraft was destroyed by impact forces and postimpact fire. All nine persons on board received fatal injuries. Shortly after the start of takeoff roll, the forward cargo compartment door opened and was struck by the left propeller. Cargo from the compartment was also struck by the same propeller. The pilot shut down the left engine, continued his takeoff, and requested clearance for an immediate landing. The National Transportation Safety Board determines that the probable cause of this accident was the inadvertent opening of the forward cargo compartment door and the subsequent discharge of cargo, which caused damage to the left propeller and additional drag at a critical phase of flight. The Safety Board believes that had the door-unsafe-indicating system been operational or had the security of the forward cargo compartment door been ensured, the accident would have been avoided. Four recommendations have been made to the Federal Aviation Administration.					
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NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D. C. 20591
AIRCRAFT ACCIDENT REPORT

Adopted: December 13, 1972

ROSE AVIATION, INC.
BEECHCRAFT 65-B80, QUEEN AIR, N841NS
ALBUQUERQUE, NEW MEXICO
MAY 19, 1972

SYNOPSIS

At approximately 1329 mountain daylight time, May 19, 1972, Rose Aviation, Inc., Beechcraft 65-B80 Queen Air, N841NS, a scheduled air taxi flight, crashed shortly after takeoff from Albuquerque International Airport, Albuquerque, New Mexico. The aircraft was destroyed by impact forces and postimpact fire. All nine persons on board received fatal injuries.

Shortly after the start of takeoff roll, the forward cargo compartment door opened and was struck by the left propeller. Cargo from the compartment was also struck by the same propeller. The National Transportation Safety Board is unable to determine the exact point in the takeoff sequence at which the pilot became aware of an abnormal situation. The left propeller was feathered and the landing gear retracted almost immediately after lift-off. The pilot then started a left turn at an altitude of 50 to 100 feet, and requested clearance for an immediate landing. After a turn of approximately 180°, the aircraft rolled violently to the left while assuming an extreme nose-low attitude, and crashed.

The National Transportation Safety Board determines that the probable cause of this accident was the inadvertent opening of the forward cargo compartment door and the subsequent discharge of cargo, which caused damage to the left propeller and additional drag at a critical phase of flight. The Safety Board believes that had the door-unsafe-indicating system been operational or had the security of the forward cargo compartment door been ensured, the accident would have been avoided.

As a result of the investigation of this accident, the Safety Board made four recommendations to the Federal Aviation Administration. (See Appendix C.)

INVESTIGATION

Ross Aviation Flight 7 (Ross 7), a scheduled air taxi flight between Albuquerque International Airport (ABQ), New Mexico, and Los Alamos, New Mexico, was scheduled to depart from ABQ at 1315 m.d.t. 1/ with one pilot and eight passengers. The destination of Ross 7, a Beechcraft 65-B⁸⁰ Queen Air, N841NE, had been changed to Santa Fe Municipal Airport because of adverse winds at Los Alamos. In addition to the pilot and passengers, the aircraft carried 35 pounds of cargo in the rear cargo compartment, and 86 pounds of cargo in the nose cargo compartment.

At 1323:40, Ross 7 requested and received permission from ABQ Tower Local Controller to taxi to Runway 17 for takeoff.

At 1326:40, ABQ Local Controller cleared Ross 7 for an intersection takeoff from a point adjacent to Taxiway 7. From this point, 7,500 feet of the 8,993-foot runway was available for takeoff. Wind was given as ". . . one nine zero degrees variable, at two two."

Moments later, Ross 7 was observed approximately 3,500 feet from the point on Runway 17 where takeoff had been initiated. At this time, the flaps and landing gear had been retracted, and the left propeller was in the full-feather position. The aircraft had attained 50 to 100 feet of altitude over the centerline of the runway. Approximately 4,000 feet of runway remained.

Ross 7 was then observed to start a shallow left turn to a magnetic heading of approximately 350°.

At 1328:35, Ross 7 requested, "Tower, Ross 7 for, uh, landing one seven." ABQ Local Controller replied, "Roger Ross 7, uh, runway two six, if you'd like, or runway one seven. Wind is two zero degrees at two three." Ross 7 did not acknowledge this transmission, nor were any further transmissions heard from the flight.

After momentarily flying straight and level at an estimated altitude of 100 feet on the approximate heading of 350°, Ross 7 was observed to assume a slight nose-high attitude then roll to the left at a rapid rate. The aircraft pitched down rapidly during the rolling maneuver.

Ross 7 struck the ground 7,000 feet east-southeast of the intersection of Runways 17 and 26, in a right-wing-low, 60° nose-down attitude after completing approximately 240° of roll to the left.

The aircraft was destroyed by impact forces and postimpact fire. The pilot and eight passengers sustained fatal injuries.

1/ All times herein are mountain daylight, based on the 24-hour clock.

Examination of the aircraft wreckage disclosed that:

1. The wing flaps and landing gear were in the retracted position.
2. There were no separations of structural components prior to impact.
3. Propeller slash marks were found on the forward cargo compartment door.
4. Both engines were capable of normal operation prior to the time that damage was inflicted to the left propeller.
5. The left propeller was in the feathered position and the tip had been broken off of one blade.

The forward cargo compartment door was recovered from the wreckage. The door locking mechanism, which was found in the unlocked position, was checked and found to function properly.

This door locking mechanism consists of three bayonet-type latches which slide into holes in the door frame and are held in place by an over-center cam. During the locking operation, which requires 40 inch-pounds of torque, the overcenter cam action has a distinctive "feel" which serves as confirmation of its locked position. The statement of a former Ross Aviation, Inc., pilot revealed that the door locking mechanism on N841NS was very difficult to operate. It had been his experience that the difficulty was such that some company personnel were unable to latch the door properly.

This aircraft was originally equipped with an optional safety interrupter switch system. This system was designed to preclude starting of the left engine if the forward cargo compartment door was not latched properly. The Deferred Discrepancy List for N841NS showed that the safety switch had been inoperative for some time. Investigation disclosed that there was no wiring to the switch.

Cargo from the forward cargo compartment was found on both sides of Runway 17, approximately 1,400 feet from the beginning of the takeoff roll. A propeller tip from the left propeller of N841NS was found at the intersection of Runways 17 and 26, 2,400 feet from the beginning of takeoff roll. Four thousand nine hundred feet of usable runway remained from this point to the departure end.

The takeoff and climb performance of the Queen Air 65-280 aircraft was computed for a 5,300-foot pressure altitude, a temperature of 83° F., takeoff weight of 8,300 pounds, the left engine stopped, and its propeller feathered at takeoff speed. These conditions approximate those associated with the takeoff of Ross 7 on the day of the accident, with the exception of the open forward cargo compartment door. The calculated climb performance was based

upon the assumption that the left engine was stopped and the propeller feathered at, or immediately after, lift-off. The results of these computations showed a takeoff speed of 93 knots calibrated airspeed (KCAS) after a roll of 2,600 feet. The single-engine best rate of climb speed was 96 KCAS. The corresponding minimum single-engine control speed (V_{mc}), assuming level flight and takeoff power on the right engine, would be 87 KCAS and stall speed calculated to be 89 KCAS. With this configuration, the performance data indicated that the aircraft could achieve a rate of climb of 188 feet per minute.

There is no information available for calculating the drag produced by the protruding cargo door and the resulting cavity in the nose compartment. The effect of the open nose cargo door on climb performance was therefore estimated, using a method derived for determining the effect of open landing gear doors. Computations thus performed indicated that the best rate of climb anticipated with the door open and takeoff power on the operating engine would be 94 feet per minute. If the pilot reduced this engine's power to M_{E10} , ^{2/} the rate of climb would be reduced to 31 feet per minute.

The climb performance would have been diminished further by turning maneuvers and air turbulence, both of which would have also affected the stall speed adversely.

The ABQ surface weather observation taken at 1257 reported, in part, ". . . temperature 81° . . . wind 220° at 24 knots, gusting to 30 knots . . . blowing dust all quadrants." A special observation taken 10 minutes after the accident reported, in part, ". . . temperature 83° . . . wind 210° at 23 knots, gusting to 31 knots . . . blowing dust all quadrants." An AIRMET ^{3/}, valid for the time of the accident, advised of light-to-moderate thermal turbulence throughout Arizona and New Mexico. Statements from pilots verified the presence of this turbulence in the traffic pattern at ABQ.

ANALYSIS AND CONCLUSIONS

Examination of the forward cargo compartment door after the accident revealed that the overcenter cam locking mechanism was in an operable condition. A pilot who had previously flown the aircraft observed difficulties encountered by ground crew personnel while attempting to close and latch the door. He indicated that some cargo handlers were unable to latch the door. No company records could be found to indicate that any maintenance had been accomplished to correct this situation. The Safety Board believes that the pilot, who had flown the aircraft for 24 hours in the last 90 days, including 3 hours the day before the accident, most likely would have been aware of this discrepancy. Therefore, extra preflight precautions should have been taken to insure the security of the door.

^{2/} Maximum except takeoff.

^{3/} An advisory concerning weather of such a degree as to be potentially hazardous to light aircraft but not necessarily hazardous to transport-category aircraft.

The first significant pieces of cargo from the forward cargo compartment were found along the sides of the runway, approximately 1,400 feet from the start of takeoff. The remaining pieces were scattered along the next 1,000 feet of runway. The left propeller blade tip was found approximately 2,400 feet from the start of takeoff. Accordingly, the Safety Board makes the following conclusions:

1. The forward cargo compartment door cam locking mechanism was not fully rotated to the overcenter position subsequent to cargo loading. Examination of the latching mechanism design revealed that when the cam locking mechanism is properly positioned in the overcenter detent, a positive lock will prevent inadvertent latching bayonet disengagement. The alignment of scribe marks on the handle assembly provides a positive indication that the latching bayonets are fully engaged and that the cam is over center. A 10° minimum displacement from the scribe mark alignment position would be evident if the cam were not over center. In this position, the bayonets could be fully engaged so that the door would otherwise appear to be secured. The investigation disclosed that the latching device on N841NS had previously been difficult to operate and required more than normal force to engage the door-latching bayonets. The Board believes that the use of excessive force might have misled the pilot to disregard the handle scribe-mark alignment and to believe that the cam was over center and the door was fully locked.
2. The cargo door bayonet-type latches became disengaged during the takeoff roll and, at some point along the ground takeoff path, the door opened into the left propeller arc. The Board believes that this occurred within the initial 1,400 feet of the takeoff. Visual assessment of the door opening was not possible from the cockpit.
3. For the next 1,000 feet of ground roll, heavy, compact metal cargo from the forward cargo compartment was falling into and being struck by the left propeller with sufficient force to shatter the pieces of cargo, break off the tip of one of the propeller blades, and heavily dent all three blades. From the point where the propeller blade tip was found, 4,900 feet of runway remained in which to stop the aircraft safely.
4. The aircraft lifted off approximately 2,600 feet from the takeoff initiation point. The decision to continue flight at this point was a matter of pilot judgment, and the known existence of precipitous terrain beyond the runway might have been a factor in the decision to continue. Performance data shows that the aircraft could have stopped on the remaining runway prior to that point where the landing gear was retracted.

Subsequent to that point, and upon reaching 50 feet of altitude, the remaining runway distance was marginal for a successful rejection of the takeoff.

5. Performance calculations accounting for the estimated effect of the open cargo door show that in level flight, with the left propeller feathered, the right engine operating at MEFO power, and the landing gear and flaps retracted, the aircraft should have had the capability to maintain a positive rate of climb of approximately 31 feet per minute.
6. From the deterioration of aircraft controllability that would have been evident from the aircraft's flight-handling characteristics, the pilot would have been aware of a loss of aircraft performance capability. However, there was no way that he could have made a reasonable judgment as to the extent of loss. Under the circumstances of this in-flight emergency, it would be reasonable to expect that the pilot would plan to land the aircraft at the first opportunity. After being cleared by ABQ tower for landing on either Runway 17 or 26, it is probable that the pilot increased the angle of bank slightly in an attempt to land on Runway 26, the nearer of the two runways. At this point, controllability of the aircraft was lost.
7. The decision of the pilot to turn immediately to another runway was probably influenced by the proximity of rising terrain; however, this action is questionable within the validity of the calculated performance capability of the airplane with the open cargo door.

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of this accident was the inadvertent opening of the forward cargo compartment door and the subsequent discharge of cargo, which caused damage to the left propeller and additional drag at a critical phase of flight. The Safety Board believes that had the door-unsafe-indicating system been operational or had the security of the forward cargo compartment door been ensured, the accident would have been avoided.

RECOMMENDATIONS

As a result of the investigation of this accident, the Safety Board on July 3, 1972, issued four recommendations (Nos. A-72-78 through 81) directed to the Federal Aviation Administrator. Copies of the recommendation letter and the Administrator's response thereto are included in Appendix C.

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

/s/ JOHN H. REED
Chairman

/s/ FRANCIS H. MCADAMS
Member

/s/ ISABEL A. BURGESS
Member

/s/ WILLIAM R. HALEY
Member

Louis M. Thayer, Member, was not present and did not participate in the adoption of this report.

December 13, 1972.

APPENDIX A

CREW INFORMATION

Pilot Richard Thomas Zettel, aged 48, was a retired Naval Aviator. He held Airline Transport Pilot Certificate No. 439020. His latest first-class medical certificate was issued December 20, 1971, with the limitation that he must wear corrective lenses for near vision when exercising the privileges of his airman certificate. He also held type ratings in Convairs 240, 340, and 440.

Pilot Zettel had accumulated approximately 5,700 hours, of which 411 hours were in Beech B80 aircraft. He had flown 85 hours in the past 90 days, and 3 hours in the past 24 hours. He was certificated and qualified for the operations involved.

APPENDIX B

AIRCRAFT INFORMATION

The aircraft was registered to Nationside Airlines Southeast, Inc., Atlanta, Georgia, on November 15, 1967; to Air South, Inc., Atlanta, Georgia, on April 9, 1969; and to Ross Aviation, Inc., Albuquerque, New Mexico, on January 29, 1970.

The total time on the aircraft was 4270:05 hours. The time accumulated since the last 100-hour inspection was 34:50 hours. The last annual inspection was completed on January 27, 1972.

The aircraft was powered by two Lycoming IO50-540-A1D engines. The No. 1 engine, serial No. L-1811-50, had been operated 1924:35 hours since manufacture, and 920:45 hours since the last major overhaul.

The No. 2 engine, serial No. L-524-50, had been operated 1716:10 hours since manufacture and 576:10 hours since the last major overhaul.

The aircraft was equipped with two Hartzell model HCB-3230B propellers. Both had a total of 1471:05 hours.

The aircraft was certificated and airworthy prior to takeoff on May 19, 1972.

UNITED STATES OF AMERICA
NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: July 3, 1972

Adopted by the NATIONAL TRANSPORTATION SAFETY BOARD
at its office in Washington, D. C.
on the 7th day of June 1972

FORWARDED TO:

Honorable John H. Shaffer
Administrator
Federal Aviation Administration
Washington, D. C. 20591

SAFETY RECOMMENDATIONS A-72-78 thru 81

A fatal aircraft accident, which the National Transportation Safety Board is currently investigating, and a recent aircraft incident have indicated to the Board that a safety problem exists on twin-engined general aviation aircraft which have baggage compartments located in the nose section.

The accident involved a Beechcraft 65-880, N841NS, which crashed on takeoff from Albuquerque, New Mexico, on May 19, 1972. Our preliminary findings indicate that the nose cargo door opened during takeoff. Pieces of loose cargo and the door were struck by the left propeller. The pilot feathered the left propeller and declared his intention to land. The aircraft crashed from a left turn following takeoff. All nine occupants sustained fatal injuries.

This aircraft was equipped with a safety interrupter switch which is designed to preclude starting of the left engine if the nose cargo compartment door is not properly latched. However, maintenance records indicate that the system had been inoperative for some time. This switch was found in the wreckage; however, the severity of the ensuing ground fire following the crash precluded the investigators from making any determination of its condition prior to the crash. This aircraft did not have any cargo restraining devices in the nose cargo compartment.

The incident, which involved a Beechcraft B-99 aircraft utilized for air taxi operations, was similar in nature except that the pilot made a

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successful emergency landing on the remaining runway. That aircraft was equipped with a cargo restraint system which was not in use, and with a door warning system which was inoperative.

The Board is concerned over this instance which has occurred despite the safeguards designed into the aircraft. The Board believes that double failure protection on these doors is required in view of the catastrophic consequences if this cargo door opens in flight. We understand that Beech Aircraft Corporation has recommended that the owners of Beech 99 aircraft with nose section cargo compartments install an external lock to provide double failure protection. Alternatively, a safety chain could be installed to prevent the door from opening fully in flight if it should become unlatched. The Board further believes that 14 CFR 23.787 (b) which provides for a cargo restraint system, if made applicable to nose section cargo compartments, would prevent cargo from shifting outward through an inadvertent opening of the cargo compartment door in flight.

To preclude further accidents/incidents of this type, the Safety Board recommends that the Federal Aviation Administration:

1. Provide for double failure protection by means of a secondary locking device or cargo restraint system on those cargo doors where inadvertent opening in flight would seriously jeopardize the safety of flight of the aircraft or the safety of its occupants on all so affected aircraft.
2. Issue an alert to all air taxi operators, advising them of the hazards associated with the improper security of cargo doors.
3. Consider rulemaking under Part 135 to require a door warning system, double locking devices, and cargo restraint systems for those cargo compartment doors where inadvertent opening in flight would seriously jeopardize the safety of flight of the aircraft or the safety of its occupants.
4. Evaluate the applicability of 14 CFR 23.787 (b) for this type of nose cargo compartment and the attendant hazard of cargo shifting such as occurred in this accident.

This matter has been discussed with representatives of your Flight Standards Service. Our Bureau of Aviation Safety Staff is available for additional discussion if desired.

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These recommendations will be released to the public on the later date shown above. No public dissemination of the contents should be made prior to that date.

Reed, Chairman, Laurel, Hickman, Thayer, and Burgess, Members, concurred in the above recommendations.


By John H. Reed
Chairman

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DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

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WASHINGTON, D.C. 20510

13 JUL 1972



OFFICE OF
THE ADMINISTRATOR

Honorable John H. Reed
Chairman, National Transportation Safety Board
Department of Transportation
Washington, D.C. 20591

Dear Mr. Chairman:

This replies to your safety recommendations A-72-78 through 81 issued on 3 July 1972. These recommendations were concerned with reported occurrences of inadvertent cargo door openings on Beechcraft 65-80 and Beechcraft 99 airplanes.

We wish to advise you that corrective action has been taken to assure a safe and proper use of the nose cargo door actuating system on Beechcraft 65-80 airplanes. As a result of the cited Albuquerque accident which investigation indicated was caused by non-latched nose cargo door, the FAA issued a safety alert to all owners and operators on 31 May 1972. This alert covered the need for positive door closure and rigging of door actuating mechanism in accordance with the manufacturer's instructions. Subsequent examination of the door's three-pin latching design indicated that if properly maintained and fully secured by operator, such provisions as specified under FAR 23.787(b) would continue to be satisfied.

With respect to the Beechcraft 99 inadvertent door opening incident, proposed rulemaking action is being considered to require a third cargo door latch device which is in addition to the two existing latches now in use. This new double failure protection device is provided in accordance with Beech Service Instruction 051-113 sent to all owners and operators on 20 June 1972. We feel that the added protection precludes need for internal tie-down provisions as the door when fully latched is sufficient to prevent cargo from becoming a hazard.

FAR 135.117 presently requires that cargo be carried in an approved cargo rack, bin, or compartment installed in the aircraft and that it

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be secured by a means approved by the Administrator. With the proposed modification to the Beech 99, and with proper maintenance, the cargo compartments of both the Beech 65 and the Beech 99 should adequately restrain cargo and fulfill the requirements of the regulation. Therefore, we do not concur that rulemaking under Part 135 be recommended.

Sincerely,



J. H. Shaffer
Administrator