Docket No. SA-111 File No. 301-46

C I V I L A E R O N A U T I C S B O A R D

ACCIDENT INVESTIGATION REPORT

Adopted: June 17, 1946 Released: June 18, 1946

PENNSYLVANIA-CENTRAL AIRLINES - BIRMINGHAM, ALABAMA, JANUARY 6, 1946

The Accident

Pennsylvania-Central Airlines' Flight 105 of January 5-6, 1946 between New York and Birmingham, crashed into a creek adjoining Birmingham Airport at 0359 CST*, January 6, 1946, after overshooting the runway during a landing. Three crew members were fatally injured, several passengers were injured, and the Douglas DC-3 was extensively damaged.

History of the Flight

Flight 105 departed La Guardia Field, New York, N. Y., at 1800, January 5, 1946, for Birmingham, Alabama, with routine stops at Pittsburgh, Pennsylvania, and Knoxville, Tennessee. Because of marginal weather conditions existing at Birmingham, a delay of 40 minutes was incurred at Knoxville, while the pilot studied the weather situation and conferred by telephone with the company Flight Dispatcher at Washington, concerning the operation. The captain and the dispatcher agreed that the flight to Birmingham was feasible inasmuch as the latest weather sequence report indicated conditions at Birmingham well above the minimums specified for that station, an adequate fuel supply could be carried, and excellent alternate airports were available.

Departure from Knoxville was made at 0151. Because of thunderstorm activity throughout the area between Birmingham and Knoxville, considerable turbulence was encountered during the flight. However, the turbulence

*All time referred to in this report is Central Standard and based on the 24-hour clock.

diminished in the vicinity of Birmingham although the sky cover at that station was gradually increasing and the ceiling was lowering. The flight reported over the Birmingham range station at 0348, on instruments at 3000 feet and was cleared to Birmingham Approach Control for approach and landing instructions. Clearance was given for a straight-in landing on Runway 18, and the flight was advised that the surface wind was SW at 5 mph or less.

Inasmuch as the aircraft was not sighted by 0351, the tower operator called Flight 105 again to ascertain whether a straight-in approach was being made. The flight advised the control tower that a standard range approach procedure was being executed and that it was at that time outbound on the north leg preparatory for a final approach. At 0354, the tower forwarded the altimeter setting to the flight and was advised that the aircraft was in a procedure turn. Inasmuch as landing instructions had already been given, no further radio contact was established.

Tower personnel first sighted Flight 105 on final approach for a south landing when it was approximately a mile north of the field. The aircraft was beneath the overcast and remained visible to ground observers while making a shallow descent towards the field. When approximately over the approach end of the runway, the descent was abruptly increased until the aircraft was leveled off close to the runway surface. Because of an airspeed which was higher than normal, it remained airborne for several hundred feet. At the intersection with the east-west runway, 1500 feet from the south end of Runway 18, first contact was made. The aircraft continued down the runway with its tail high for approximately 1000 feet when it started veering to the left. It continued beyond the end of the runway, through a wire fence and crashed into the south bank of Village Creek bordering the airport.

The danger of a crash became apparent while the DC-3 was still on the runway and approaching the end with relatively high speed. Having been

alerted by the tower, the emergency crew proceeded directly to the scene of the accident and assisted in removal of the passengers and extrication of the three crew members who were severely crushed within the telescoped forward portion of the aircraft. The three pilots died shortly after the accident as a result of injuries sustained.

1 Investigation

Investigation of the wrecked aircraft, inspection of tire marks on the sod beyond the runway, and testimony of observers indicated conclusively the ground path of Flight 105 until it crashed into Village Creek and the sequence of damage resulting. The creek, which was 35 feet wide and 12 feet deep, lay approximately 100 feet beyond the end of Runway 18 and ran at right angles to that runway. The right wheel of the aircraft rolled off the north bank first allowing the right wing to drop and come in contact with large rocks along the bank and in the ditch which demolished the wing. The aircraft then turned sharply to the right and dove against the south bank of the creek crushing the nose rearward. The telescoping effect extended to a station behind the pilot seats. The remainder of the aircraft was damaged little as a result of the accident.

It was observed that the tail wheel control was in the "unlock" position and that the tailwheel swiveled freely. The evidence indicated that the tailwheel had been unlocked prior to impact. The brakes were functioning normally although hydraulic fluid had drained from broken lines in the right landing gear. Examination of both powerplants disclosed no indication of malfunction, and it was determined that all mechanical failure observed resulted from impact with the creek bank. The flap control was in the "up" position and the wing flaps were fully retracted at the time of the accident. However, it could not be determined whether the flaps had been used during

the approach or, if so, at what time they had been retracted. All control cables appeared to be intact and no indication was observed of slippage or other malfunction.

Examination of the tire marks on the runway indicated that the landing roll had begun at the intersection of the east-west runway with Runway 18 and continued until the crash. No tire marks were observed which indicated contact with the runway at a previous point. The tracks veered to the left after a roll of 950 feet, the left wheel rolling off the runway after a roll of 1360 feet. The aircraft remained on the ground for a total landing roll of 1600 feet. The position of initial contact with the runway was substantiated by testimony of witnesses to the approach of Flight 105.

The stewardess testified that the "No Smoking" light went off and remained off momentarily after having been on during the instrument approach to Birmingham Airport. After a brief interval the light again came on and remained on for the remainder of the landing approach. Inasmuch as the "No Smoking" light switch is connected to the landing gear control, it can be concluded that the control handle was moved to the "up" position during the approach and subsequently returned to the "down" position.

Approximately 25 minutes before arriving over the Birmingham range station, the flight was advised by the company radio operator that Birmingham was reporting: "Indefinite ceiling, 700 feet, overcast, lower broken, visibility seven miles, light rain, overcast estimated 2000 feet." The stewardess testified that she had been instructed by the pilot before reaching Birmingham that it might be necessary to return to Knoxville because of the weather conditions at the destination. The instrument minimums for Birmingham at night as prescribed by the PCA Operations Manual are 900 feet and two miles visibility.

At the time of the accident the pilot had completed 8½ hours of flying time between New York and Birmingham. A considerable portion of the flight had been negotiated under instrument conditions with turbulence ranging from light to moderate and the flight was conducted almost entirely at night. Because of strong headwinds, the total flying time for Flight 105 was considerably more than the time normally logged for that route.

An aftercast of the weather conditions prevailing at the time of the accident indicated a deep low pressure system centered in Wisconsin which had moved during the preceding 12 hours from northern Missouri and was continuing in a north-easterly direction. Within that twelve hour period a cold front had passed Birmingham, the passage of which led most forecasters to predict improving conditions within the dry air mass following. However, by 1930 of the day preceding the accident, it became apparent that another low pressure system was moving north-eastward through Texas with which there was associated a well defined warm front extending across the Gulf Coast to Florida. As this warm front progressed northward toward Birmingham, it caused lowering of ceilings and increase of sky cover ahead of the front.

The circulation within the eastern United States remained southerly throughout the period and the flow of warm, moist, unstable tropical maritime air into the Appalachian Mountains maintained thunderstorm activity in the area between Knoxville and Birmingham throughout the night. The steep pressure gradients maintained high winds aloft but the rough terrain caused a decided decrease in wind velocities nearer the surface in the vicinity of Birmingham. A weather observation made at Birmingham 3 minutes after the accident contains the following report of existing weather: 600 feet overcast, visibility, 5 miles, light rain wind southwest 3 miles per hour. The dew point spread had decreased to almost zero at the time of the accident.

Discussion:

No indication of equipment failure was disclosed as result of the investigation other than that caused by impact. All evidence available to the Board leads to the conclusion that the aircraft, its powerplants and its accessories were functioning normally at the time of the landing.

Testimony of witnesses, the tire tracks on the runway, and the fact that the tail wheel was found unlocked indicates conclusively that the pilot attempted to turn the aircraft during the landing roll in order to avoid collision with objects beyond the runway. However, due to the speed of the aircraft, the tail remained high throughout most of the landing roll preventing the possibility of a safe ground-loop. Failing in his attempt to ground-loop the aircraft, the pilot straightened his roll and skidded the remaining 500 feet until he crashed into the creek.

Inasmuch as the testimony of observers consistently reported the approach as fast and in view of the fact that the tail wheel remained off the runway throughout almost all of the landing run, it can be concluded that the airspeed of the aircraft during the approach and initial contact with the runway was considerably above normal. While some testimony indicates the possibility of initial contact prior to the point established by the Board, no marks were located on the runway to substantiate such testimony. However, regardless of the possibility of a bounce previous to the tracks described above, the landing roll cannot be said to have been started until the aircraft was definitely on the runway and rolling inasmuch as the aircraft was airborne before reaching the intersection of the east-west runway with runway 18.

No discrepancy was noted within the procedures followed by the pilot for instrument approach. However, it is apparent that the weather conditions were very marginal and that the pilot entertained some doubt that a landing

could be made at Birmingham. While the latest weather report obtained by the pilot in flight stated that an indefinite broken overcast existed, the lowest portions of which were at 700 feet,, due to the irregularity of the base, it may have been possible to complete a contact landing approach from the minimum altitude of 900 feet. The evidence indicates that it was the intention of the pilot to attempt an instrument approach in order to determine whether visual contact with the airport was possible. It is further evident that the pilot decided to initiate a missed approach procedure while on his final approach and that the landing gear was started up. Approximately 30 seconds thereafter, the field apparently came in view and the gear was again lowered for a landing. In the subsequent descent, the pilot was unable to reduce the airspeed sufficiently for a normal landing approach with the result that the aircraft remained airborne over two-thirds of the runway and made initial contact at an airspeed higher than normal.

It is possible that the strain of a prolonged flight under difficult flight conditions was a factor in this accident. While it is impossible to determine accurately the extent of pilot fatigue under the conditions of the flight, there is no doubt that those conditions were such that a greater than normal mental and physical fatigue could be expected.

Dispatch and meteorological personnel concerned were in agreement as to the weather situation and all evidence indicates that, although some lag in forecasting worsening conditions at Birmingham may have existed, the forecasts prepared were completely justified on the basis of available information concerning the trends in progress. The weather data pertinent to the flight were made available to the crew in flight as quickly as facilities permitted and there appears to be no indication that inadequate caution was exercised in dispatching of the flight or in flight planning by the pilots. All evidence indicates that the flight was correctly informed concerning the

weather at Birmingham until reporting over the Birmingham range station. However, since the last weather observation provided the flight, the ceiling at Birmingham had dropped from a reported 700 feet broken to 600 feet overcast, but the latter ceiling observation was not obtained until 3 minutes after the accident. The flight was aware, therefore, that the weather trend was definitely lowering but was not informed as to the limits that such a trend had reached at the time of arrival at Birmingham.

Findings:

Upon the basis of all available evidence, the Board finds that:

1. The company, aircraft and crew were properly certificated for the flight.

2. Headwinds during the flight from New York to Birmingham resulted in a prolonged flight under conditions of visibility and turbulence conducive to greater than normal pilot fatigue.

3. Weather conditions were worsening rapidly at Birmingham during the flight from Knoxville.

4. The pilot executed an instrument approach to Birmingham to determine whether a contact landing approach was possible.

5. During the instrument approach, the pilot retracted the landing gear; shortly thereafter, he again extended the gear and established a landing approach.

6. The aircraft was higher than normal, the descent more rapid than usual and the airspeed excessive during the landing approach.

7. Ground contact was established with only 1500 feet of runway remaining.

8. The pilot attempted to ground loop after 900 feet of landing roll but, being unable to do so safely, continued beyond the runway until colliding with the creek bank.

Probable Cause

On the basis of the foregoing, the Board determines that the probable cause of this accident was the action of the pilot in committing himself to a landing from an approach which was too high and too fast.

BY THE CIVIL AERONAUTICS BOARD:

/s/ Harllee Branch

/s/ Josh Lee

/s/ Clarence M. Young

Pogue, Chairman, and Ryan, Vice-Chairman, did not take part in the decision.

SUPPLEMENTAL DATA

Investigation and Hearing

The Civil Aeronautics Board received notification of the accident at 0600, January 6, 1946, and immediately initiated an investigation in accordance with the provisions of Section 702 (a)(2) of the Civil Aeronautics Act of 1938, as amended. Air Safety Investigators of the Board's Atlanta Office arrived at the scene of the accident approximately 1430, January 6, 1946, and were later assisted in the investigation by other members of the Safety Bureau staff.

In connection with the investigation the Board ordered a public hearing which was held January 15 and 16, 1946, in the County Court House, Birmingham, Alabama.

Air Carrier

Pennsylvania-Central Airlines, Inc., a Delaware Corporation with headquarters in Washington, D. C., was operating as an air carrier under a certificate of public convenience and necessity and an air carrier operating certificate both issued pursuant to the Civil Aeronautics Act of 1938, as amended. These certificates authorized the company to fly persons, property and mail between various points in the United States including New York, N. Y., and Birmingham, Alabama.

Flight Personnel

Captain Raymond Paulis, age 28, of Rochester, New York, was pilot of the aircraft and had accumulated a total of 4517 hours flying time of which 3617 hours were in DC-3 equipment. First Officer Delmar D. Duskin, age 27, of Oklahoma City, Oklahoma, was co-pilot and had accumulated a total of 3401 hours flying time, of which 773 were as co-pilot on DC-3 equipment. Miss Betty Proctor of Lexington, Kentucky, was stewardess. Captain S. A. Carson accompanied the flight for a route check and was riding the "jump-seat" as a fourth crew

member at the time of the accident. The captain and first officer were properly certificated for the flight and the captain was qualified for the route.

Aircraft

The aircraft, NC 21786, was a Douglas DC3 manufactured in July 1941. It was sold to Pennsylvania-Central Airlines by the Army on November 1, 1941. Total flying time was 5,864:36 hours with 388:16 hours since last major overhaul. It was equipped with Wright G-102A engines and Hamilton Standard propellers. Total time on the engines was 6,688:06 hours and 11,131:22 hours, with 388:16 hours since last major overhaul. At the time of departure from Knoxville the total weight of the plane was less than the allowable maximum and the center of gravity was within allowable limits.