SA-190

File No: 1-0034

CIVIL AERONAUTICS BOARD

ACCIDENT INVESTIGATION REPORT

Adopted: February 2, 1950

Released: February 6, 1950

COASTAL CARGO COMPANY, INC.—NEAR BRANDYWINE, MD., JANUARY 6, 1949

The Accident

At approximately 0720,[1] January 6, 1949, NC-53210, a DC-3 airplane, owned and operated by Coastal Cargo Company, Inc., an irregular air carrier, crashed 1,500 yards southeast of the Brandywine radio range station, Brandywine, Md. The pilot and copilot, the only occupants, were killed. The airplane was destroyed.

History of the Flight

The flight departed from Miami, Fla., for Boston, Mass., at approximately 1610, January 5, 1949, with a crew consisting of Stuart L. Morrill, pilot, and Theodore Catz, copilot. A landing was made at Morrison Field, West Palm Beach, Fla., where 6,255 pounds of flowers were loaded. With the flowers, 3,600 pounds of fuel, 254 pounds of oil, and the crew, the airplane weighed 26,944 pounds at time of takeoff, which was 44 pounds above the allowable of 26,900 pounds. All cargo was loaded so that the center of gravity of the airplane was within the certificated limits. Departure from West Palm Beach was accomplished at approximately 1900 after which the flight proceeded without incident to its first fueling stop, Raleigh-Durham, N. C.

While on the Raleigh-Durham Airport the airplane was fueled to its capacity of 700 gallons, which was 100 gallons more than was on board at West Palm Beach. As a result, the airplane weighed 27,544 pounds when taking off from Raleigh, which constituted an overload of 644 pounds. Because of unfavorable weather conditions, takeoff had been delayed until 0610, January 6, 1949. The flight then continued en route to Boston following an instrument flight plan. Forty-five minutes after departure from Raleigh, at 0655, a routine position report was received by Richmond Radio that the flight was over Richmond, Va., at 9,000 feet. Washington Radio attempted to contact the flight at 0707, but no further communication was received from the flight by any CAA communication station although continuous efforts were made for a period of approximately 50 minutes.

The airplane was observed at approximately 0720 over Brandywine, Md., at considerable altitude immediately underneath a cloud deck, proceeding in normal level flight in a northerly direction. Then, to those on the ground, it appeared that the airplane turned left and spun for two complete turns, losing considerable altitude. Partial recovery was made, but the airplane began spinning for a second time to the left. Again it appeared that a partial recovery was made, but again the aircraft spun to the left, losing altitude to below 3,000 feet. After this, ground observers watched the aircraft fly level but erratically for a brief period. They were able to see that the right horizontal stabilizer was deflected upward to a near vertical position, and that the right elevator was missing. The airplane then entered a diving left turn, and crashed 1,500 yards southeast of the Brandywine radio range station. Fire started shortly after impact.

Investigation

With the exception of the right elevator, which was found 3.6 miles east of the scene of the accident, the aircraft wreckage was located within a 100-yard radius on moderately wooded terrain. Markings on the ground showed that the airplane had been banked to the left when it crashed. There was extensive fire damage across the wing center section from engine nacelle to engine

[1] All times referred to herein are Eastern Standard and based on the 24-hour clock.

nacelle. The damage was so extensive that the nose, cockpit, and forward fuselage structure had lost their identity; however, the remainder of the wreckage did not burn. The fuselage was broken in two, forward of the cargo doors. The left wing was distorted and twisted out of shape; the right wing was broken near the center section and inverted. Though the vertical stabilizer remained intact, the rudder was bent and twisted. All damage, excepting that in the horizontal tail surfaces, was a result of impact or fire.

Examination of the left horizontal stabilizer disclosed that it had been bent upward by excessive air loads. Impressions left on the top skin adjacent to the tailcone showed that the stabilizer had rotated from its horizontal position to approximately a vertical position at least three or four times while the airplane was in flight. All parts involved in this failure, when examined, were found to be of required strength, and the construction of the stabilizer was standard.

As previously stated, the right elevator was located 3.6 miles from the remainder of the wreckage. This surface had been bent in an upward direction from the inner attachment to the tip. All rivets in the three hinge connections had been sheared in an upward direction. These rivets, when examined, were found to be of required strength and material. The examination of the elevator, elevator brackets, torque tube, and attachment fittings showed that they had been made of sound stock, and that separation of the right elevator from the stabilizer had resulted from extreme air loads. The left elevator was found to be still attached to the left horizontal stabilizer. However, its structure, along with rivets and hinge attachment fittings, contained evidence of extreme positive air loads similar to that found in the right elevator and its attachments.

The aircraft log and engine log books were destroyed by fire. Remaining records for the airplane consisted of CAA certification forms, and military records which had been kept during the time that the airplane had been operated by the Army Air Forces. All of these records indicated that the airplane was in an airworthy condition at the time of the flight. Maintenance facilities for the company were examined in Miami, Fla. They were found to be adequate to accomplish all repair and maintenance required in the operation of the airplane.

The airplane was equipped with a standard Sperry automatic pilot, and it was the policy of the company to use the automatic pilot in cruising flight. Because of the complete destruction of the forward part of the fuselage, including cockpit, instruments, and controls, there were not sufficient parts remaining to make any determination as to the operating condition of the automatic pilot immediately before the accident. The airplane was not equipped with deicer boots for the wings and empennage,[2] but it did have propeller anti-icing equipment.

Weather data available to Captain Morrill prior to his departure from Raleigh-Durham showed that a cold front had just passed Lynchburg, Va., Washington, D. C., and Baltimore, Md. The ceilings at those points were 2,000 feet or better, and the visibility was in excess of five miles. The Weather Bureau forecast indicated that icing could be expected in the clouds at altitudes above the freezing level which was predicted to be 10,000 feet in Virginia and Maryland, except that the level would lower with the passage of the cold front.

An aftercast of the weather conditions showed that at the time of takeoff from Raleigh-Durham it was raining and instrument conditions existed above 1,000 feet. Surface temperature was about 61 degrees. At the cruising altitude of 9,000 feet, the flight was in a high layer of clouds. Although the temperature was indicated to have been about 36 degrees over Richmond, temperatures were lower to the northward. Freezing temperature and icing conditions existed at 9,000 feet during the last 15 to 20 minutes of flight. The temperature was above freezing at 8,500 feet or below. Turbulence

[2] Section 42.36 of the Civil Air Regulations effective at the time of the accident provided, "Aircraft must not be flown into known or probable heavy icing conditions and may be flown into light or medium icing conditions only if the aircraft is equipped with an approved means for deicing the wings, propellers and such other parts of the aircraft as are essential to safety."

accompanied the cold front, but it was not unusually severe.

Captain Stuart L. Morrill held a valid airline transport pilot rating, and had accumulated 3,605 hours of flight time, 3,100 hours of which were in C-47s or DC-3s. He had logged a total of 250 hours of flight time under actual instrument conditions.

First Officer Theodore Catz held a valid airman certificate with a commercial pilot and instrument rating. Available records showed that he had a total of approximately 360 flight hours.

Testimony was received during the hearing to the effect that Captain Morrill had a habit of sleeping in the cockpit during flight. A flight plan dated January 3, 1949, three days before the date of the accident, showed that Captain Morrill and First Officer Catz had made a flight in another DC-3 from Teterboro, N. J., to Miami, Fla., with several intermediate stops. This flight involved 20:35 consecutive hours in the air, 6:50 hours being flown on January 3 and 13:45 hours being flown on January 4. The landing at Miami was accomplished at 1810, January 4, 1949. Investigation disclosed that the crew stayed in a hotel in Miami, and had available approximately 22 hours before reporting for the northbound flight.[3]

Analysis

Since the structural failures in this case were found to be the result of excessive air loads, and since there was no violent weather or erratic flight observed prior to the time that the airplane made its first spin, it must be concluded that the failures resulted from the spins or the recoveries from those spins. Once the horizontal tail surfaces failed the airplane could not be controlled and, as a result, it crashed.

The airplane had been in the air one hour and five minutes from the time of its departure from Raleigh-Durham until the time of the accident. During this period of time it would burn approximately 105 gallons or 630 pounds of fuel. Although the aircraft may have been overloaded 644 pounds at the time of its departure from Raleigh, it would have been overloaded only approximately 14 pounds at the time of the accident. This is too small an amount to be considered a factor in the accident.

Since icing conditions did exist at the cruising level of 9,000 feet, and since the aircraft was not equipped with deicer boots on the wings and empennage, there is a strong possibility that ice actually did accumulate on the aircraft. Accordingly, the loss of control of the aircraft and the spins which followed may have been the result of ice and the turbulence which accompanied the cold front. From all evidence disclosed in the investigation, this conclusion appears as the most reasonable explanation of the spins which were observed just before the aircraft crashed. As a result of the spins, severe airloads were encountered which caused the failure of the left horizontal stabilizer and the elevators.

Although it is true that the crew had a period of 22 hours for rest before making this particular flight, it could not be determined how much rest was actually had by the crew during that period. The crew had previously flown for a long period, 20:35 hours, and in addition, Captain Morrill was reportedly known for sleeping in the cockpit. Accordingly, Captain Morrill, and possibly the first officer too, may have fallen asleep; or they were not alert enough to recognize and correct for an icing condition which became progressively more critical until controlability of the aircraft was lost.

Findings

1. The air carrier, the aircraft, and the crew were properly certificated.

2. The aircraft departed from Raleigh, N. C., overloaded 644 pounds, and at the time of the accident was overloaded approximately 14 pounds.

3. The aircraft was observed at considerable altitude, immediately underneath a cloud deck, in straight and level flight after which it made a series of three spins.

4. After the recovery from the last spin, the aircraft flew level but erratically

[3] Section 42.210 of the Civil Air Regulations, effective at the time of the accident provided, "(b) The pilot shall receive 24 hours of rest before being assigned further duty when he has flown in excess of 8 hours during any 24 consecutive hours ..." Section 42.11 "(b) A pilot shall not be on duty for more than 16 hours during any 24 consecutive hours."

for a brief period following which it crashed to the ground.

5. The left horizontal stabilizer was bent upwards by severe air loads, and it had rotated several times to a near vertical position while the aircraft was in flight.

6. The right elevator was bent upwards and had been separated from the stabilizer as a result of extreme air loads; and the left elevator, although not totally separated from the stabilizer, was similarly damaged.

7. At the time of the accident, there was an icing condition present in the layer of broken clouds at the flight's cruising altitude of 9,000 feet, the temperature at that altitude being 32 degrees Fahrenheit or slightly below. Moderate turbulence also existed.

8. The aircraft was equipped with anti-icing equipment for the propellers, but it was not equipped with deicer boots for the wings and empennage.

9. Before taking off for the flight, the pilots had a rest period of 22 hours previous to which they had completed another flight of 20 hours and 35 minutes.

Probable Cause

The Board determines that the probable cause of this accident was the loss of control of the aircraft which resulted from an icing condition, turbulence, and lack of alertness on the part of the crew. As a result, the aircraft spun, and during the spins, or attempted recovery from the spins, severe airloads were encountered which failed the left horizontal stabilizer and the elevators.

BY THE CIVIL AERONAUTICS BOARD·

/s/ JOSEPH J. O'CONNELL, JR.
/s/ OSWALD RYAN
/s/ JOSH LEE
/s/ RUSSELL B. ADAMS

Harold A. Jones, Member of the Board, did not participate in the adoption of this report.

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Supplemental Data

Investigation and Hearing

The Civil Aeronautics Board received notification of the accident by telephone at 0840, January 6, 1949, from CAA Communications. An investigation was immediately initiated in accordance with the provisions of Section 702 (a) (2) of the Civil Aeronautics Act of 1938, as amended. As a part of the investigation, a public hearing was held April 21, 1949, at Washington, D. C.

Air Carrier

Coastal Cargo Company, Inc., is a corporation organized under the laws of the State of New Jersey. Its principal operating base is located at Teterboro Air Terminal, Teterboro, N. J., and its maintenance base is located in Miami, Fla. The Corporation holds a letter of registration No. 1110 issued by the CAB September 2, 1947, and a non-scheduled operating certificate issued December 17, 1947, by the CAA. The company operates primarily between New York and Miami in the transportation of property.

Flight Personnel

Captain Stuart L. Morrill held a valid airline transport pilot rating, and had accumulated 3,605 hours of flight time, 3,100 hours of which were in C-47s or DC-3s. He had logged a total of 250 hours of flight time under actual instrument conditions. Captain Morrill's training had been obtained in the Army Air Forces. His employment by Coastal Cargo Company was on a trip basis and data from December 22, 1948.

First Officer Theodore Catz held a valid airman certificate with a commercial pilot and instrument rating. Available records showed that he had a total of approximately 360 flight hours. Both pilots had successfully passed their last CAA medical examination, and thirty days previous to the accident they had been examined by a CAA Aeronautical Agent at which time they were found fully qualified for the type of flight operations conducted by Coastal Cargo Company.

The Aircraft

NC-53210 was a currently certificated Douglas DC-3A manufactured June 1944. It was equipped with two Pratt and Whitney Model 1830-43-90D engines. Both engines had a total of 413 hours since the time of last overhaul. The examination of all CAA records indicated that the airplane and all its components were airworthy and that the airplane was properly certificated prior to the time of the last flight.