

CIVIL AERONAUTICS BOARD

ACCIDENT INVESTIGATION REPORT

Adopted: March 27, 1950

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CAPITAL AIRLINES, INC. AND CESSNA 140—MILWAUKEE, WIS., AUGUST 7, 1949**The Accident**

An air collision occurred between a Capital Airlines' DC-3 aircraft, NC-45379, and a Cessna 140 aircraft, N-3198N, at 1709,¹ August 7, 1949, near Maitland Lake Front Airport, Milwaukee, Wis. The pilot of the Cessna was killed and that aircraft was totally destroyed. None of the 23 occupants of the DC-3 was injured but the aircraft was substantially damaged.

History of the Flight

Capital Airlines' Flight 19 of August 7, 1949, was flying between Norfolk, Va., and Milwaukee, Wis., with scheduled stops en route. At Detroit, Mich., a routine crew change was made and the new crew consisted of Captain J. N. Bolick, First Officer L. F. Davis, and Stewardess Shirlee Jean Davidson. The trip to Muskegon, Mich., the last scheduled stop before Milwaukee, was routine. At 1634, Flight 19 departed from Muskegon with 20 passengers aboard, and was cleared VFR to Milwaukee. The weather en route and at Milwaukee was reported as clear with 15 miles visibility. At the time of takeoff the aircraft weighed 23,574 pounds which was within the allowable gross weight and all disposable load was properly distributed so that the center of gravity of the aircraft was within the certificated limits. Over Lake Michigan, approximately six miles east of Milwaukee, the crew contacted Milwaukee Tower at General Mitchell Field and was advised the wind was south-southeast eight to ten miles per hour and that the runway in use was Number 13. At this time the aircraft was descending from its cruising altitude of 4,000 feet at an indicated air speed of 160 miles per hour.

The Cessna 140, a high wing monoplane type aircraft, took off from Maitland Airport at approximately 1700 with Arthur Rapps as pilot. The aircraft was seen to climb and circle the airport in a left-hand traffic pattern.

The DC-3 was observed while descending to approach Maitland Airport from the east and to fly over the field in a shallow left turn toward the southwest. At the same time, the Cessna was also observed to be making a climbing left turn near the southwest boundary of the airport. Neither aircraft altered its course and they collided. The Cessna received major damage and immediately fell to the ground and was destroyed by impact. Although the DC-3 received major damage flight was continued to the General Mitchell Airport where a safe landing was made.

Investigation

Damage to the DC-3 resulting from the collision was confined to the right wing. Investigation disclosed that at collision impact, a section of the right wing, approximately six feet inboard from the wing tip, and a portion of the right aileron were torn free from the aircraft and had fallen to the ground. The inboard edge of this tear was ragged and on the lower surface of the wing were well-defined tire marks. These tire marks extended diagonally inboard from the leading edge and across the chord of the wing. The severed part of the aileron and the wing tip were found in the vicinity of the Cessna wreckage. The aileron was severed at the fourth hinge outboard from the fuselage. The damaged wing tip was badly crushed and showed evidence of having been struck on its leading edge by a force which left a tapered impression four to five inches wide with the narrow end of the taper near its trailing

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

edge This was made when the wing tip collided with and wrapped around the left landing gear strut of the Cessna. Subsequent examination of the aircraft disclosed that all controls operated in a normal manner through their full travel distances. A study of the aircraft's records showed that prior to the accident the DC-3 was in an airworthy condition.

Examination of the Cessna revealed that it struck the ground at a point approximately 360 feet southwest of the Maitland Airport and in an almost vertical nosedown attitude. The propeller and powerplant were deeply imbedded in the ground. Impact forces were of such magnitude that the wings folded with their rear spars moving forward until they rested alongside the front spars. The cabin section was twisted and crushed, and directly behind the cabin the fuselage was bent inward. The left rear wing strut was bent outward near the fuselage and had brown colored marks on its surface. These marks were made when this strut contacted the right aileron of the DC-3 which is painted a similar color.

Investigation further disclosed that at the time of collision the right wheel of the Cessna was torn free of the aircraft. It was found approximately 2,500 feet west of Maitland Airport. The left wheel was torn off by impact with the ground and was found near the wreckage. Further examination of the aircraft indicated that the powerplant, wings, fuselage, and the empennage were not damaged by collision impact.

So far as can be determined from the aircraft's records and from persons having knowledge of the Cessna, it was airworthy prior to the accident.

As previously stated, the weather was clear and the visibility was good. Between the ground and the 4,000-foot level was a slight haze which restricted the visibility somewhat from the reported 15 miles. However, both members of the DC-3 crew stated that the visibility was good.

Captain Bolick flew from Muskegon to Milwaukee at an altitude of 4,000 feet and stayed well to the right of Green Airway No. 2. At approximately 1700, nine minutes before arriving in the Milwaukee area, a slow descent was begun and a few minutes later instructions were received from the Milwaukee Tower to land on Runway 13. Before reaching the shoreline the crew began the prelanding check

and this check was completed, with the exception of lowering the landing gear and flaps, about the time they started over Maitland Field. Maitland Airport is located on the shore of Lake Michigan 4.9 miles north of General Mitchell Airport and approximately 3.5 miles north of Green Airway No. 2.

The crew stated that during the descent they saw light aircraft flying in the vicinity of the airport and that they were maintaining a constant lookout. A 270-degree heading was held until over the airport, and then a shallow left turn was started to a heading of 225 degrees. At that time the altitude was estimated to be approximately 1,900 feet above the ground and the air speed was 160 miles an hour. During the turn, neither pilot saw any close-by aircraft.

Ground witnesses stated that when the DC-3 flew over Maitland Airport its estimated altitude was between 900 and 1,000 feet. Following the accident, the controller on duty at the General Mitchell Airport estimated the altitude of the DC-3 to be 1,500 feet when it was first seen on base leg about three miles north of the airport. The visibility to the north from the tower is somewhat limited because of a rise in the terrain. However, the aircraft was observed from this point until it landed.

In order to determine the closest approximation to the actual altitude of the aircraft when the accident occurred and the distance and altitude at which an aircraft could be seen from the Milwaukee Tower when looking to the north, several comparison test flights were made. These flights were made on August 24, 1949, using the Civil Aeronautics Board's DC-3 with Captain Bolick at the controls, and with a Board pilot and other qualified observers aboard. As a part of the test, the Milwaukee tower controller on duty at the time of the accident observed the flights from the tower and an eye witness to the accident, who was a pilot of considerable experience, observed them from Maitland Field. A simulated pattern was flown at different altitudes, unknown to the observers. These were (1) 1,900 feet; (2) 1,500 feet; (3) 1,200 feet. After observing these flights, the tower controller said that the second flight, at 1,500 feet, most nearly approximated the altitude of Capital's Flight 19 when he first observed it from the tower. The

ground observer said the third flight was nearest the altitude of the DC-3 immediately prior to the accident, however, he estimated the altitude of this test flight to be 900 feet.

Maitland Airport, as stated above, is situated on the lake front and is near the center of Milwaukee's downtown business section. The airport has only one runway, and this extends in a north and south direction. The traffic pattern around the airport is such that when landings and takeoffs are made to the south, a left hand pattern is used and when made to the north, a right hand pattern is proper. All aircraft enter and leave the traffic pattern at an altitude of 800 feet. Turns are made in this manner to avoid low flying over the city. Because the airport is bounded on three sides by the city of Milwaukee and on the east by Lake Michigan, it is common practice for pilots, after takeoff, to circle and climb in order to obtain a safe altitude before departing the area. According to witnesses, the pilot of the Cessna was conforming to the airport traffic pattern and was circling the airport to gain altitude. Arthur Rapps, the pilot and co-owner of the Cessna, had based his aircraft at Maitland Airport since March 1949. He was familiar with the airport traffic pattern and cognizant of the air traffic conditions throughout the entire area. Captain Bolick had been employed by Capital Airlines since June 17, 1942. He had flown the route in question since 1943 and was thoroughly familiar with the traffic conditions in the entire area surrounding General Mitchell Airport. First Officer Davis was also familiar with the route.

Analysis

From an examination of the damage and markings to the right wing and aileron of the DC-3 and from a vector analysis, assuming the speed of the DC-3 to be 160 miles per hour and that of the Cessna to be 80 miles per hour, the angle between the longitudinal axis of the two aircraft, at the moment of impact, was 72 degrees. From the above and the knowledge that the heading of the DC-3 was approximately 225 degrees immediately prior to the collision, the heading of the Cessna then was determined to be approximately 153 degrees

It was established that the DC-3 was descending and making a shallow left turn when it crossed over Maitland Airport. Since weather was not a factor in this accident and the reported visibility was 15 miles, the pilots of the DC-3 should have seen and avoided the Cessna. The obligation of pilots to remain vigilant at all times to observe and avoid other aircraft in the air is stated in Sections 60.12, 60.14 and 60.15 of the Civil Air Regulations.² Furthermore, the crew acknowledged seeing other aircraft flying in the vicinity of the airport when they were descending from the cruising level. Since it was Sunday afternoon and more than the average air traffic could be expected in the Maitland Airport area, the pilots of the DC-3 should have exercised the highest degree of alertness for other aircraft. As stated, there was a considerable difference in the air speeds of these aircraft. The DC-3 was descending and overtaking the smaller aircraft at about double its air speed, the Cessna was ahead and to its right.

The pilot of the Cessna was circling Maitland Airport in the accustomed manner to gain altitude when the accident occurred. Because the Cessna 140 is a high-wing monoplane type aircraft, cockpit vision is restricted to the side and above on the inside of turns. Since the Cessna was observed to be making a left climbing turn just prior to the collision, the evidence shows that throughout the turn the approaching DC-3 was hidden from the pilot by the aircraft's left wing. Due to the above-mentioned differences in air speeds of the two aircraft, it appears that if the Cessna pilot had observed the DC-3 prior to starting his left turn, the DC-3 would have been above and too far away from him to have caused immediate concern.

² "60.12 Careless or reckless operation. No person shall operate an aircraft in a careless or reckless manner so as to endanger the life or property of others.

"60.14 (d) Overtaking. An aircraft that is being overtaken has the right-of-way, and the overtaking aircraft, whether climbing, descending, or in horizontal flight, shall keep out of the way of the other aircraft by altering its course to the right, and no subsequent change in the relative positions of the two aircraft shall absolve the overtaking aircraft from this obligation until it is entirely past and clear.

"60.15 Proximity of aircraft. No person shall operate an aircraft in such proximity to other aircraft as to create a collision hazard. No person shall operate an aircraft in formation flight when passengers are carried for hire. No aircraft shall be operated in formation flight except by prearrangement between the pilots in command of such aircraft."

Findings

On the basis of all available evidence the Board finds that

1. The air carrier, the DC-3 and the Cessna, and their crews were properly certificated.
2. The DC-3 and the Cessna were in an airworthy condition and operating without mechanical trouble prior to the accident.
3. At the time of the accident the weather was clear and the visibility was 15 miles.
4. The DC-3 was descending in a shallow left turn while crossing Maitland Airport at an altitude of 1,200 to 1,500 feet above the ground and at an indicated air speed of 160 miles per hour.
5. The Cessna was executing a climbing left turn and was ahead and to the right of the DC-3.
6. The Cessna pilot's vision was obstructed by the left wing of his air-

craft throughout the left turn immediately prior to the collision, and he was unable to see and avoid the DC-3.

7. The pilots of the DC-3 aircraft failed to observe the other aircraft.

8. The aircraft collided at an angle of approximately 72 degrees, in the vicinity of Maitland Airport.

Probable Cause

The Board determines that the probable cause of this accident was the failure of the pilots in the DC-3 to observe and avoid the Cessna aircraft in flight.

BY THE CIVIL AERONAUTICS BOARD

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

Supplemental Data

Investigation and Hearing

The Civil Aeronautics Board received notification of the accident on August 7, 1949, at 1835 CST, by telephone from CAA Communications, Chicago, Ill., and immediately initiated an investigation in accordance with the provisions of Section 702 (a) (2) of the Civil Aeronautics Act of 1938, as amended. As part of the investigation a hearing was held August 23, 1949, in Milwaukee, Wis.

Air Carrier

Capital Airlines, Inc., is a Delaware Corporation with headquarters in Washington, D C. The company holds certificates of public convenience and necessity authorizing it to engage in air transportation between various points in the United States including Muskegon, Mich., and Milwaukee, Wis., and air carrier operating certificates issued by the Civil Aeronautics Administration.

Personnel

Captain Jack Newell Bolick, age 29, held a valid airman certificate with an airline transport rating. He had a total of 5,439 flying hours, of which 5,146 were on DC-3 type aircraft. His last CAA physical examination was accomplished June 29, 1949. He had been employed by Capital Airlines since June 17, 1942.

First Officer L F Davis, age 32, held a valid airman certificate with an airline transport rating. He had also a total of 6,826 flying hours, of which 942 were in DC-3 type aircraft. His last physical examination was accomplished January 11, 1949. He had been employed by Capital Airlines since April 29, 1946.

Arthur Rapps, age 33, held a valid airman certificate with a private pilot rating. He had accumulated approximately 225 flying hours in light type aircraft. His last CAA physical examination was accomplished June 24, 1948.

The Aircraft

NC-45379, a DC-3, was purchased December 15, 1945. The aircraft was owned and operated by Capital Airlines, and was currently certificated by the Civil Aeronautics Administration. It had been flown a total of 12,617 hours since the time of its purchase. The two engines were Wright Model No. GR-1820-G-102A. The propellers were Hamilton Standard, Hydromatic, Model No. 23E50.

N-3198N, the Cessna aircraft involved in this accident, was currently certificated by the Civil Aeronautics Administration. The engine was a Continental C-85-12. Total time for aircraft and engine was approximately 350 hours.