

CIVIL AERONAUTICS BOARD
SAFETY BUREAU

ACCIDENT INVESTIGATION REPORT

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Adopted: October 20, 1947

Released: October 22, 1947

EASTERN AIR LINES, INC.—UNIVERSAL AIR LINES—ABERDEEN, MARYLAND—
DECEMBER 19, 1946

The Accident

An Eastern Air Lines' Douglas, DC-4, NC 88813 and a Universal Air Lines' Douglas, DC-3, NC 54374 collided in flight at 1807,* December 19, 1946, approximately three miles north of Aberdeen, Maryland. Although both aircraft sustained major damage, none of the 22 passengers and crew of three in the DC-3, nor the 56 passengers and crew of four in the DC-4 received other than minor injuries.

History of the Flights

During the night of December 19, the DC-3, NC 54374, was operated by Universal Air Lines in a flight designated as Number 7, scheduled from Newark, New Jersey, to Miami, Florida, with a refueling stop at Raleigh, North Carolina. The DC-4, NC 88813, was operated by Eastern Air Lines in a flight designated as Number 605, from Newark, New Jersey, to Miami, non-stop.

The pilot of Universal Air Line Flight 7 filed an instrument flight plan with the New York Airway Traffic Control Center to cruise at 2,000 feet to the Raleigh-Durham Airport via Airway Amber 7. Having received approval for the above flight plan, Flight 7 departed Newark Airport at 1707. The flight was not advised concerning any traffic en route.

The Eastern Air Lines' pilot of Flight 605 filed an instrument flight plan with the New York Center of Airway Traffic Control to cruise at 2,000 feet to Miami. Inasmuch as Eastern Flight 605 would be operating along the same route being flown by Universal Flight 7 between Newark and Washington, D. C., Airway Traffic Control issued a clearance to Flight

605, approving a cruising altitude of 2,000 feet but requiring that the flight be conducted in accordance with contact flight rules. Prior to departure, the flight was advised that Flight 7 was proceeding south-bound along the same route proposed by Flight 605 and at 2,000 feet. Flight 605 departed Newark at 1722, fifteen minutes after the departure of Flight 7.

One hour after departure from Newark and when in the vicinity of Aberdeen, Maryland, the Universal DC-3 collided with an object which, at the time, the pilots mistook for a large bird. At no time did either of the pilots of Flight 7 observe any other aircraft in that vicinity. Although the top right side of the pilot's compartment was badly crushed, the aircraft was still controllable and the captain decided to proceed to Baltimore for an emergency landing. While en route to Baltimore, the lights of Phillips Army Air Field, Aberdeen, Maryland, were sighted and the flight proceeded to Phillips Field where a safe landing was made.

The captain of the Eastern DC-4 at no time observed any other aircraft in the vicinity of Aberdeen. The co-pilot, however, suddenly saw the lights of an aircraft close to and to the left of the DC-4 and immediately rolled the DC-4 into a bank to the right and pulled the nose up forcefully. Almost simultaneously, both pilots felt the impact with the other aircraft. Since no difficulty was encountered in controlling the aircraft, Flight 605 continued to Washington, at reduced airspeed and a landing was made at the National Airport without difficulty.

Investigation

Inspection of the Universal DC-3 disclosed that the forward top portion of

*All times referred to in this report are Eastern Standard and based on the 24-hour clock.

the fuselage above the right side of the cockpit was extensively damaged and the top skin covering of the radio compartment was torn off. Parts of the hydraulic system and radio components were strewn about the forward compartments of the aircraft. No evidence existed that any mechanical failure or equipment malfunctioning had occurred in this aircraft prior to the accident. Inspection of the company maintenance records indicates that the DC-3 was in an airworthy condition prior to the commencement of the flight.

Examination of the Eastern DC-4 revealed that the portion of the fuselage below and in front of the horizontal stabilizer had been extensively damaged. It was apparent that impact in flight had carried away a portion of the bottom of the fuselage, including the tailskid. No damage to the primary control cables or the control surfaces was observed, although the structure above the cables was demolished to a depth of 17 inches above the original fuselage fairing. A close examination of marks on the underside of the left stabilizer indicated that small fractured segments of a porcelain insulator were embedded in the aluminum alloy skin. Further study disclosed that this mark was the result of contact with the porcelain radio-lead-in insulator on the top right side of the fuselage of the DC-3. A deep vertical indentation was observed on the leading edge of the left stabilizer at a point approximately 10 feet from the aircraft center line. Subsequent investigation revealed that this indentation matched exactly the broad side shape of the vertical wooden aerial mast of the DC-3.¹ With the exception of the damage incurred as a result of the collision, no evidence was disclosed as to mechanical failure or equipment malfunctioning. Inspection of the maintenance records disclosed that the aircraft was in an airworthy condition at the time of take-off from Newark.

Parts which were torn from both aircraft at impact were located in an orchard into which they had fallen 4 miles north-northeast of Aberdeen. It was not possible to determine the exact location of the aircraft at the moment of collision except that it was a maximum distance of 2/3 of a mile in a northerly

direction from this point. However, it can be concluded that the collision occurred close to the east edge of Airway Amber 7 at a point between 4 and 5 miles from and approximately north-northeast of Aberdeen.

Investigation disclosed that the navigation lights of both aircraft were functioning properly at the time of their departure from Newark and at the time of their respective landings at Phillips Field and Washington National Airport after the collision. The testimony of the flight crews indicate that the lights on both aircrafts were operating normally during the flight.

The flights involved in the accident were flying near the center of a high pressure area of polar continental air, and the weather conditions between New York and Baltimore during the time of the flights were at all times above contact flight rule minimums. It can be concluded, therefore, that weather was not involved in this accident. On December 19, civil twilight officially ended at 1719, 31 minutes after sunset, and no moon was in the sky until approximately eight hours later. At the time of the accident, therefore, the flights were being conducted in complete darkness.

Discussion

Analysis of the impact marks and the airspeeds of each aircraft indicated that, at the moment of collision, their flight paths intersected at an angle of 74 degrees. From this analysis it can be determined that immediately prior to impact the DC-3 was at an approximate relative bearing of 43 degrees to the left of the point of impact on the empennage of the DC-4.² Such a location should have rendered the DC-3 visible to the pilots of the DC-4 until immediately before the accident occurred. Shortly before the collision, the DC-4 was at a relative bearing approximately 63 degrees to the right of the pilot compartment of the DC-3. The DC-4, therefore, should have been visible to the pilots of the DC-3 shortly before and until the moment of collision.

The structural member between the side window and the sliding panel in the DC-4 cockpit restricts somewhat the pilot's vision at a relative bearing of 45

¹See figure 2

²See figure 1

degrees to the left of a plane parallel to the longitudinal axis of the aircraft. It appears, in this instance, that the DC-3 remained approximately within a range of reference with respect to the DC-4, which may have partially hidden the DC-3 from sight until immediately before the accident occurred. However, it must be recognized that no aircraft exists in air carrier operation which does not possess some restriction to visibility in the cockpit. Since such obstructions to visibility are common knowledge to pilots operating DC-4 equipment and as the extent of such obstructions cannot be considered hazardous when due caution is exercised by the crew, it must be concluded that safe operation of this equipment requires that the pilot assume the responsibility for looking around structural members in order to permit such surveillance of the area ahead of the flight as would assure protection from collision with other aircraft.

Airway Traffic Control is established for the purpose of maintaining traffic separation in controlled areas under conditions in which it is impossible for pilots to perform such functions themselves. In determining the responsibility or the part of individual pilots for traffic separation, the rule of "see and be seen" must be applied. This rule requires in effect that under conditions of visibility in which pilots can see other aircraft sufficiently to provide adequate traffic separation, the pilot must assume complete responsibility for avoidance of collision in flight. Airway Traffic Control cannot deny the use of controlled areas to flights being conducted under conditions in which the visibility is adequate for pilots, at all times, to see other aircraft and be seen in flight. Since both aircraft in this instance were operating under contact conditions, none of the pilots involved could presume that exclusive use of the airway between New York and Washington at that altitude had been granted his respective flight.

Since the Eastern DC-4 was being operated under a contact flight rules clearance and since its crew were informed of the flight of Universal Flight 7 approximately 15 minutes ahead on the same route, the responsibility of its pilot was obvious. The testimony of the captain of Eastern Flight 605 indicates

that he anticipated overtaking Universal Flight 7 in the vicinity of Baltimore. It should, therefore, have been expected that the DC-4 crew would have been constantly on the alert for the DC-3 in this area. Furthermore, the captain of Eastern Flight 605 was aware of the fact that he could have expected to encounter traffic at 2,000 feet flying along Airway Amber 7 in either direction or crossing the airway at any point. In view of this fact, it was incumbent upon both crew members of this aircraft to exercise particular caution in order that traffic separation may have been assured. In view of the fact that the DC-3 remained within the forward 180 degrees of pilot reference until immediately before the accident, and since the captain at no time observed the DC-3 and the copilot did not observe the DC-3 until immediately prior to impact, it must be concluded that the Eastern flight crew were insufficiently alert.

Although operating under an instrument flight rules clearance, Universal Flight 7 was being conducted under contact conditions. Approval by Airway Traffic Control of an instrument flight rules clearance, therefore, did not mean that the cruising altitude prescribed was in any sense "protected." The pilot could reasonably have been expected to encounter traffic on or crossing Amber 7 at 2,000 feet at any point along its route and would have been expected, therefore, to have maintained such vigilance as would have assured adequate traffic separation at all times. In view of the fact that the DC-4 remained within the forward 180 degrees of the DC-3 for a short period of time prior to the collision, and since neither of the crew members of Universal Flight 7 observed the DC-4 at any time, it must be concluded that these pilots were not sufficiently alert to other traffic.

In summarizing its investigation of this accident, the Board concludes that the greater laxity must be charged to the Eastern DC-4 flight crew. However, it is apparent that a proper exercise of vigilance on the part of either crew would undoubtedly have enabled it to avoid collision in this instance. It must be concluded, therefore, that the lack of vigilance of each flight crew is contributory in this instance.

Findings

On the basis of all available evidence, the Board finds that

1. The aircraft and crews were properly certificated.
2. At the time of take-off from Newark, the total weight of each aircraft was less than the maximum allowable gross, and its load was distributed with respect to the center of gravity within approved limits.
3. Universal Flight 7, a Douglas DC-3, departed Newark at 1707, December 19, 1946, on an instrument flight clearance, via Airway Amber 7, over Washington to Raleigh, at 2,000 feet.
4. Eastern Flight 605, a Douglas DC-4, departed Newark at 1722, December 19, 1946, on a contact clearance at 2,000 feet, via Airway Amber 7, over Washington to Miami, non-stop.
5. The DC-4 overtook the DC-3 in the vicinity of Aberdeen, Maryland.
6. The crew of Universal Flight 7 at no time observed the DC-4 in flight.
7. The captain of Eastern Flight 605 at no time saw the DC-3 in flight and the co-pilot observed the DC-3 too late to avoid collision.
8. Shortly before the collision and while on intersecting courses, the DC-4

was at a relative bearing of 63 degrees right of the DC-3, and the DC-3 was at a relative bearing of 43 degrees left of the DC-4.

9. The flight paths of the two aircraft intersected at an angle of 74 degrees, the lower portion of the empennage of the DC-4 contacting the top of the pilot compartment of the DC-3.

10. Since the aircraft were still controllable, the DC-3 landed safely at Phillips Field, and the DC-4 continued to Washington National Airport where a safe landing was made.

11. None of the occupants of either aircraft sustained other than minor injuries.

Probable Cause

The Board determines that the probable cause of this accident was the lack of vigilance on the part of the pilots of both aircraft

BY THE CIVIL AERONAUTICS BOARD

/s/ J M LANDIS
/s/ OSWALD RYAN
/s/ JOSH LEE

Branch, Member, did not take part in the decision.

FIGURE 1

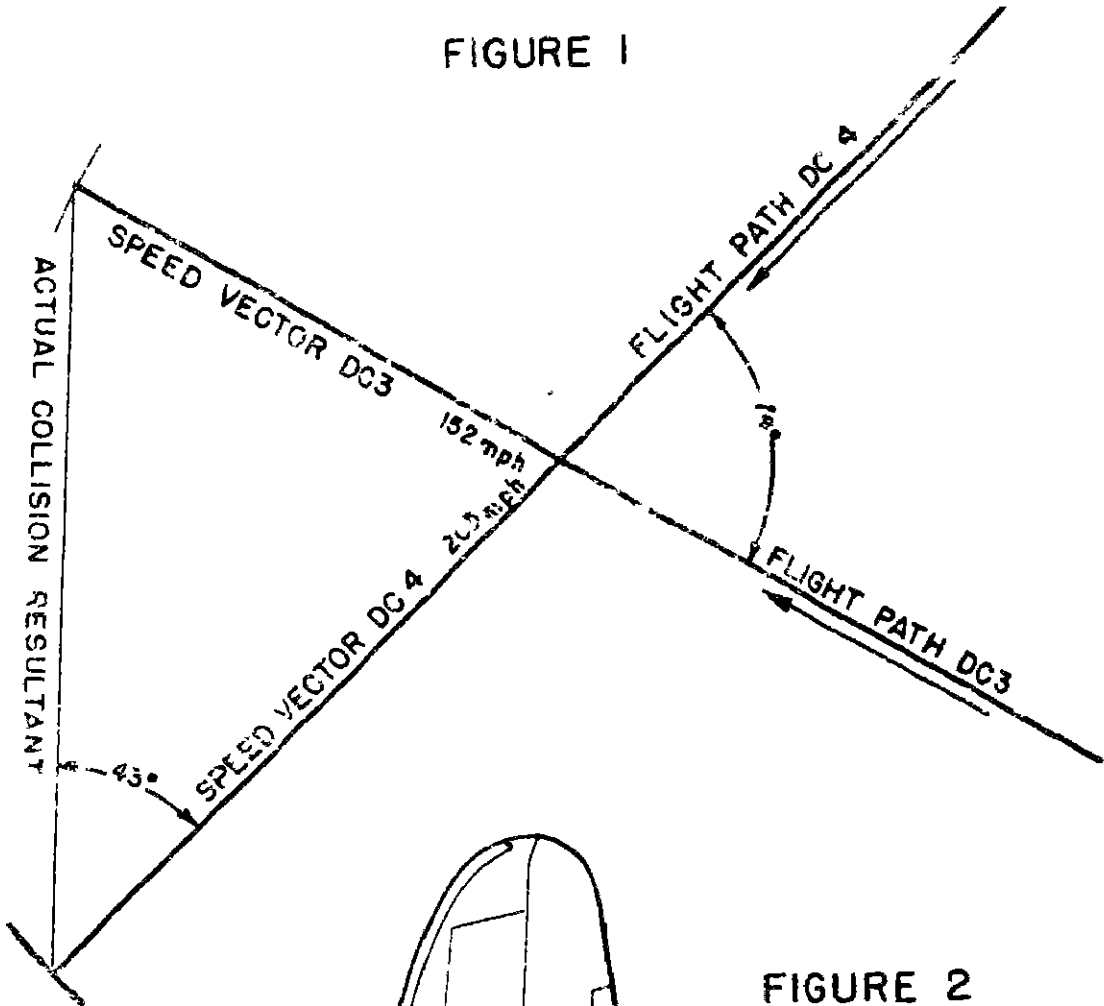
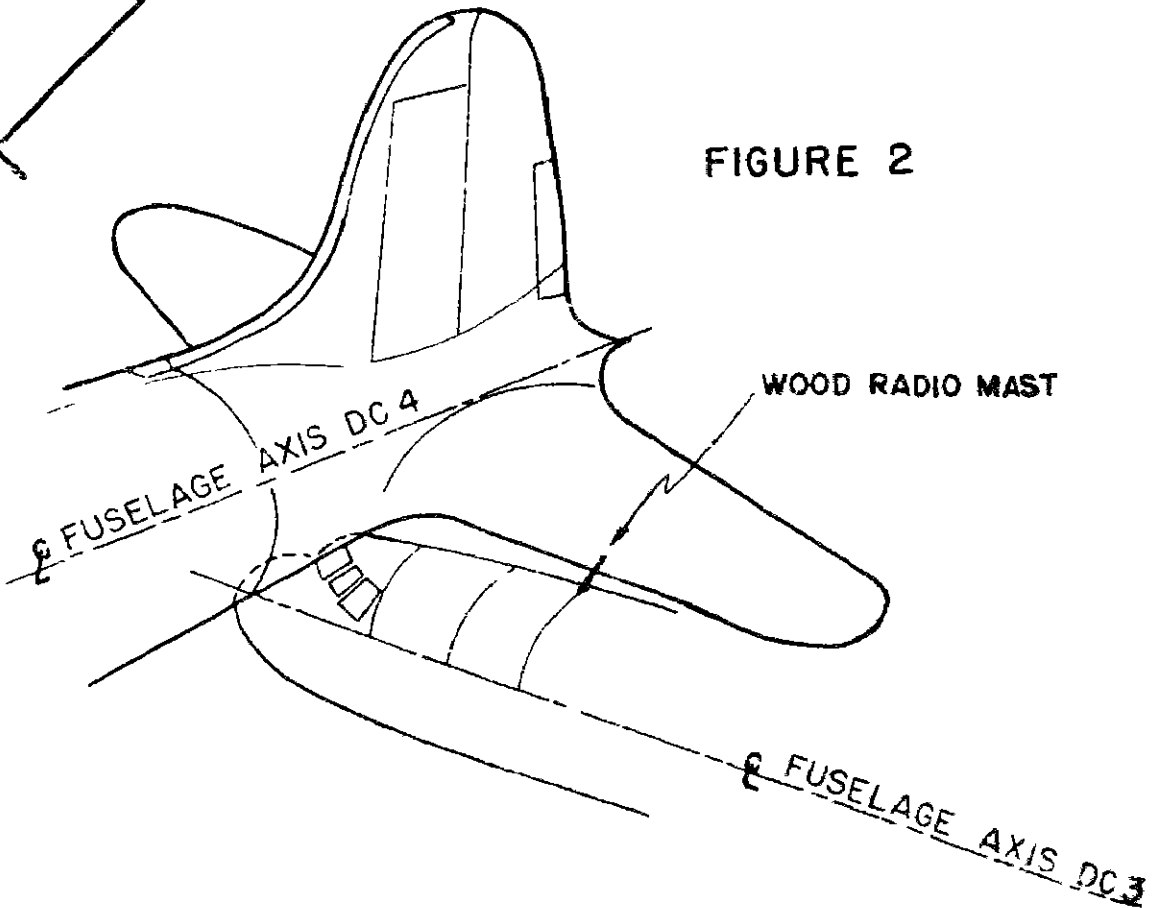


FIGURE 2



Supplemental Data

Investigation and Hearing

The Civil Aeronautics Board was notified of the accident at 1850, December 19, 1946, and an investigation was immediately initiated in accordance with the provisions of Section 702 (a) (2) of the Civil Aeronautics Act of 1938, as amended. Personnel from the Board's Washington Office proceeded to Washington National Airport and Phillips Army Air Field the following morning and were subsequently assisted in the investigation by other members of the Safety Bureau. A public hearing was ordered and was held at New York, N. Y., January 8, 1947.

Air Carrier

Eastern Air Lines, Inc., incorporated in the State of Delaware, maintains its headquarters at Miami, Florida. At the time of the accident, Eastern Air Lines was conducting its operations involving the transportation of persons, property, and mail between Newark and Miami in accordance with a certificate of public convenience and necessity and air carrier operating certificate, both of which had been issued pursuant to the Civil Aeronautics Act of 1938, as amended.

Universal Air Lines, Inc., a non-certificated air carrier,* is incorporated in the State of Delaware and maintains its headquarters at Miami, Florida.

Flight Crew

Captain Joseph B. Kuhn, age 50, of Miami, Florida, was pilot of Eastern Air Lines Flight 605. Captain Kuhn possessed an air line transport pilot rating, effective at the time of the accident, and had accumulated a total of 16,350 hours, of which 465 hours had been obtained on DC-4 equipment. R. J. Brown, age 31, of Miami, Florida, was co-pilot at the time of the accident. He possessed a commercial pilot certificate with instrument and instructor ratings and had accumulated a total of 5,028 hours, of which 238 hours had been obtained in DC-4 aircraft. George F.

Merrill and Mary Wilson (Purser and Flight Attendant) comprised the remainder of the crew. Both pilots were properly certificated for the operation and the captain was qualified over the route in accordance with Civil Air Regulations.

Captain Henry Norris, age 28, of Miami, Florida, was pilot of Universal Air Lines Flight 7 and, at the time of the accident, possessed a commercial pilot certificate with an instrument rating. He had accumulated a total of 2,600 hours, of which approximately 550 hours had been obtained in DC-3 equipment. Captain Eugene W. Harvey of Miami Beach, Florida, accompanied the flight as co-pilot. He possessed an air line transport pilot rating, and, until the date of the accident, had accumulated a total of 3,100 hours, of which 750 hours had been obtained in DC-3 aircraft. Joan E. Cotton of Miami, Florida, was the stewardess.

Aircraft

NC 88813, a Douglas C51B-DC, was owned and operated by Eastern Air Lines, Inc., and at the time of the accident it had been operated a total of 4,174 hours. It was equipped with four Pratt & Whitney 2SD13G engines on which Hamilton Standard propellers were installed. All engines had been operated a total of 560 hours and were new when installed. The gross weight at the time of take-off was considerably less than the allowable maximum and the weight was distributed in respect to the center of gravity within approved limits.

NC 54374, a Douglas C17, DC-3, was owned and operated by Universal Air Lines, Inc., and had been operated a total of 8,398 hours. It was equipped with two Pratt & Whitney 1830-92 engines on which Hamilton Standard propellers were installed. The total times for the left and right engine were 5,332 hours and 3,544 hours respectively, and both engines had been operated 475 hours since the last major overhaul. At the time of take-off, the gross weight was within maximum allowable limits, and the load was distributed with respect to the center of gravity within approved limits.

*A non-certificated air carrier refers to a company operating in air commerce without a certificate of public convenience and necessity, and is commonly referred to as a non-scheduled air carrier.