

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: November 30, 1945

Released: December 3, 1945

EASTERN AIR LINES - USAF - NEAR FLORENCE, S.C. - JULY 12, 1945

Summary

An air collision between EAL's Flight 45 en route from Boston, Mass., to Miami, Fla., and a USAF A-26 aircraft engaged in local practice flight resulted fatally to one occupant of the airliner and to two occupants of the Army plane, major damage to the first plane and demolition of the latter. Three passengers and the four crew members of the airliner received injuries which were not critical.

The airliner, a DC3, was in straight flight and letting down at approximately 200 feet per minute toward Columbia, S.C., its next scheduled stop about 62 miles away. The Army plane at the instant of impact had just returned to straight level flight after having been banked 15° or 20° to the left in a turn of about two miles radius for more than one minute. Impact occurred at an altitude of approximately 3100 feet about 12 miles WNW of Florence while the planes were flying at approximately right angles with the A-26 to the left of the DC3. The point of collision was about 8 miles to the right of the airways boundary and approximately 15 miles from the USAF Airport at Florence where the A-26 was based.

The significant factors of this accident are:

1. The DC3 was off the airway but had the right-of-way.
2. The A-26 had for a distance of several miles been in an attitude so that its pilot could not see other aircraft to his right, i.e., "give way" side.

On the basis of the evidence available at this time the Board determines that the probable cause of this accident was the failure of each pilot to see the other aircraft in time to avoid collision. Contributing factors were the DC3 pilot's deviation from the airway in the proximity of an active USAF base and his lack of vigilance, and the Army pilot's continuing a maneuver which restricted his vision in an area not set aside for such maneuvers.

This report is based upon evidence acquired in the Board's investigation and hearing held at Miami, Fla., July 21, 1945.

NARRATIVE DESCRIPTION OF THE ACCIDENT

EAL Flight 45 left Boston, Mass., on schedule at 0855 EWT* for Miami, Fla., with stops scheduled at New York, N.Y., Washington, D.C., Columbia, S.C., and Jacksonville, Fla. Arrival at New York was at 1011 where a complete crew change was made. Departure from New York was at 1030 and arrival at Washington at 1203.

At Washington the flight was cleared under contact flight rules to Columbia, S.C., and the crew remained the same as when leaving New York. There were 20 passengers, three of them infants. Departure was three minutes behind schedule.

The flight proceeded uneventfully and routine position reports were made at 1230, 1303, 1349, and at 1431, the latter being "over" Florence. However, prior to reporting over Florence the captain of the DC3 had left the airway (Amber 7) and four or five minutes after the 1431 position report was approximately eight miles to the right of the airway.

At 1315 an Army A-26 aircraft left the USAAF Base at Florence on a two-hour training mission and was flown about 40 miles northwest to a properly designated military practice area. Here its pilot engaged in certain military flying which he completed in approximately thirty minutes. He then left the restricted area to return to the Florence Base. When about 15 or 20 miles from this base he started practicing aural nulls** using the Florence radio station. The final turn was to the left with the A-26 banked approximately 15° or 20° and at an airspeed of about 220 m.p.h. This turn, which the Army pilot estimated had been continued for one or one and one-half minutes, was then stopped and for the first time the Army pilot saw the DC3 almost directly ahead of him and on an approximate crossing path from his right. (See attached sketch.) As nearly as can be ascertained the A-26 was seen by the pilot of the DC3 at about this same time and in a direction approximately 90° to his left.

The pilot of the A-26 pushed the controls forward in an attempt to pass under the other plane. The captain of the DC3 pulled back on his controls. Almost immediately after each pilot had observed the other plane the collision occurred.

Initial impact was with the vertical fin of the A-26 against the leading edge of the DC3's left wing at a point slightly in from the landing light. The fin progressed along this leading edge until it struck the left engine nacelle, tearing loose that engine. This engine then moved to the right sufficiently to allow its still rotating propeller to strike and cut into the fuselage of the DC3 at a point just

*Time throughout this report is Eastern War and based on the 24-hour clock.

** This consists of gradually turning the airplane until the audibility of a radio station is at a minimum at which time that station is abeam of the aircraft.

behind the baggage compartment door. The top four or five feet of the A-26's fin and rudder were broken off and parts of these also struck the DC3 fuselage causing other holes behind the one previously mentioned. In the DC3 an infant passenger was fatally injured and three adult passengers received shock and minor injuries.

For an instant both aircraft continued in their original directions. The right propeller of the DC3 severed the A-26 fuselage at a point forward of the empennage. The A-26 rolled to an inverted position and at an altitude of about 900 feet its pilot successfully bailed out after ordering a gunner who was riding forward to do likewise. This gunner, however, did not or was not able to bail out and was killed in the crash. The tail gunner was struck by a propeller of the DC3 and was probably killed at that time.

At the time of impact the captain of the DC3 was temporarily stunned by being thrown against the left side of the cockpit. However, he was able to maintain control of the aircraft by gliding steeply and shortly discovered that there was no power available from the right engine as its propeller blades were gone. At this time the copilot sent an emergency call stating that they had been in an air collision and giving the position. The aircraft continued in a sharp glide toward an open region and was landed with flaps and wheels up in a cotton field. Near the end of the landing run it groundlooped about 170° to the right and the right engine fell off. No personal injuries were sustained during this landing.

Captain Davis is to be commended for the high type of professional airmanship he displayed in safely landing the badly crippled airliner.

THE BOARD'S INVESTIGATION

The Atlanta Office of the Civil Aeronautics Board received notification about one hour after the collision occurred and the Board immediately initiated an investigation in accordance with the provisions of Section 702 (a) (2) of the Civil Aeronautics Act of 1938, as amended. The Senior Air Safety Investigator in charge of the Atlanta Office of the Board proceeded to Florence, S. C., arriving there at 1946 on July 12, 1945, and began the investigation. Other members of the Board's Safety Bureau staff arrived later and assisted in the investigation.

Hearing

In connection with the investigation the Board ordered a Public Hearing which was held at Miami, Fla., on July 21, 1945. The Chief of the Investigation Division served as Presiding Officer and others of the Safety Bureau staff participated.

OPERATIONAL DATA

Air Carrier

At the time of the accident Eastern Air Lines, Inc., a Delaware corporation with headquarters in New York City, 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 corporation to fly persons, property and mail between various points in the United States, including Washington, D. C., and Columbia, S. C.

Civil Aircraft

Aircraft NC 25647, a Douglas DC3, was purchased by Eastern Air Lines on June 8, 1940. It had been flown approximately 21,154 hours of which slightly more than 6000 had been since the last overhaul. The engines were Wright Cyclone G202A with total times of 8,163 and 11,662 hours for left and right respectively and 525 hours each since the last overhaul. The aircraft had been flown approximately 23 hours since the last check. At the time of departure from Washington the total weight was under that permissible and this load was disposed within acceptable limits relative to the center of gravity of the aircraft. The aircraft was properly certificated.

Military Aircraft

The A-26, Army serial No. 44-35553, was a high performance, twin-engined plane. Military records indicate that it was in an airworthy condition.

Flight Personnel of the DC3

The crew of the DC3 consisted of Captain Gaston D. Davis, age 35, of Miami, Fla., First Officer Norman L. Martindale, age 25, of Coral Gables, Fla., and Flight Attendants Enoch Mather and Peggy Avant. The captain and first officer were properly certificated and qualified for the duties of this flight.

Personnel of the A-26

First Lieutenant Stephen G. Jones, age 24, a rated military pilot assigned to the USAAF Base at Florence, S. C., had flown about 1400 hours of which some 300 had been in A-26 aircraft. He held a commercial pilot certificate issued by the Civil Aeronautics Administration. Lieutenant Jones was accompanied by two enlisted crew members.

EVIDENCE DISCLOSED BY INVESTIGATION

Examination of the Wreckage

Close scrutiny of the wreckage of both aircraft was made to determine their relative positions at the time of collision. These examinations entirely substantiated the statements of pilots, passengers and ground witnesses as to the manner of collision. They proved that the planes collided while at approximately right angles with the A-26 to the left of and slightly lower than the DC3.

The propellers of the A-26, although badly damaged, bore no marks from the collision proper, indicating that the A-26 was a few feet below the DC3. The high fin and rudder of the A-26 made the initial impact and the nature of the subsequent damage again bears out the approximate right angle of collision.

Weather

Weather conditions in the vicinity and at the time of the collision were: High and lower broken clouds with the lower layer having a base 4000 to 5000 feet above the surface. Visibility was 15 miles or better on the surface and a light easterly wind prevailed. Information from pilots who had flown near the scene of the accident at about the time it occurred indicated that haze aloft reduced the visibility to an estimated six miles.

The flights were in the clear well below all cloud layers and there was no evidence to indicate that the vision of either pilot was obscured by the sun. There does not appear to have been any weather factors that might have contributed to the collision other than the possibility that haze aloft may have restricted visibility beyond an approximate six miles in a horizontal direction.

Possibility of Pilot's Impaired Vision or Distraction

Investigation disclosed that neither pilot was hooded for simulated instrument flight and there was no indication that either was doing anything that might have distracted his attention.

CONCLUSIONS AND FINDINGS

A few miles beyond Florence the airway turns about 40° to the right. An attempt to save time and distance by cutting across this dogleg could

account for Captain Davis having been so appreciably off the airway.* He testified that he had turned to the right to avoid passing over the Florence Air Base. However, flight at any normal cruising altitude within the confines of the airway, even if it did necessitate passing near the Florence Base, would be above air traffic of the airport and consequently be less subject to collision hazard than flight off the airway. Although the DC3 had the right-of-way** there was a lack of vigilance on the part of Captain Davis, especially in view of his being off the airway and of his knowledge of the probable presence of fast military planes in the vicinity.

The Army pilot, Lieutenant Jones, had finished his specific practice maneuvers in an area set aside for such purpose and thus protected from other flight traffic. The point he chose for practicing "aural nulls" was not in such a protected area although it was not restricted against such maneuvers. However, when he elected to practice in an unprotected area it became his responsibility to assure himself that it would not endanger other traffic. It is hazardous to fly for an extended period of time in a turn where all vision to the right side of the aircraft is obscured by the structure. Lieutenant Jones testified that he had been in the final turn for a minute or a minute and a half which at 320 m.p.h. would amount to as much as 5½ miles. In view of the fact that a light haze existed, which reduced the visibility at the altitude of collision to about 6 miles, Lieutenant Jones' judgment in so prolonging the turn was faulty.

Both pilots attempted to change altitude, one up, the other down, when they first saw one another immediately prior to the collision. However, the limited time and the high speed at which the planes approached each other, about 400 feet per second, made the collision inevitable.

With all the foregoing facts and considerations in mind the Board finds that:

1. The pilot of the DC3 had deviated from course and was about 8 miles off the airway.
2. The DC3, being to the right of the A-26, had the right-of-way according to the Civil Air Regulations.

*According to CAR Part 61.731. "Deviation from airway. No scheduled air carrier aircraft shall deviate from its prescribed airway or, if there be no airway, from an area between two lines parallel to and 5 miles on either side of the center of the authorized route, except when operating in accordance with instructions issued by a certificated air-traffic control-tower operator or when circumstances render such deviation necessary as a safety measure. Any deviation of more than 25 miles on either side of the center line of the prescribed airway or authorized route shall be explained by the pilot in a written report to the Administrator of Civil Aeronautics. Such report shall be made within 7 days after the completion of the flight."

**CAR 60.3401 states "Crossing. When two aircraft are on crossing courses at approximately the same altitude, the aircraft which has the other on its left shall have right-of-way, and the other aircraft shall give way."

3. The A-26 was being flown in an extended turn which restricted the pilot's vision to the right.
4. The A-26 was engaged in a practice maneuver in an undesignated area.

PROBABLE CAUSE

On the basis of the evidence available at this time the Board determines that the probable cause of this accident was the failure of each pilot to see the other aircraft in time to avoid collision. Contributing factors were the DC3 pilot's deviation from the airway in the proximity of an active USAF base and his lack of vigilance, and the Army pilot's continuing a maneuver which restricted his vision in an area not set aside for such maneuvers.

BY THE CIVIL AERONAUTICS BOARD:

/s/ L. Welch Pogue

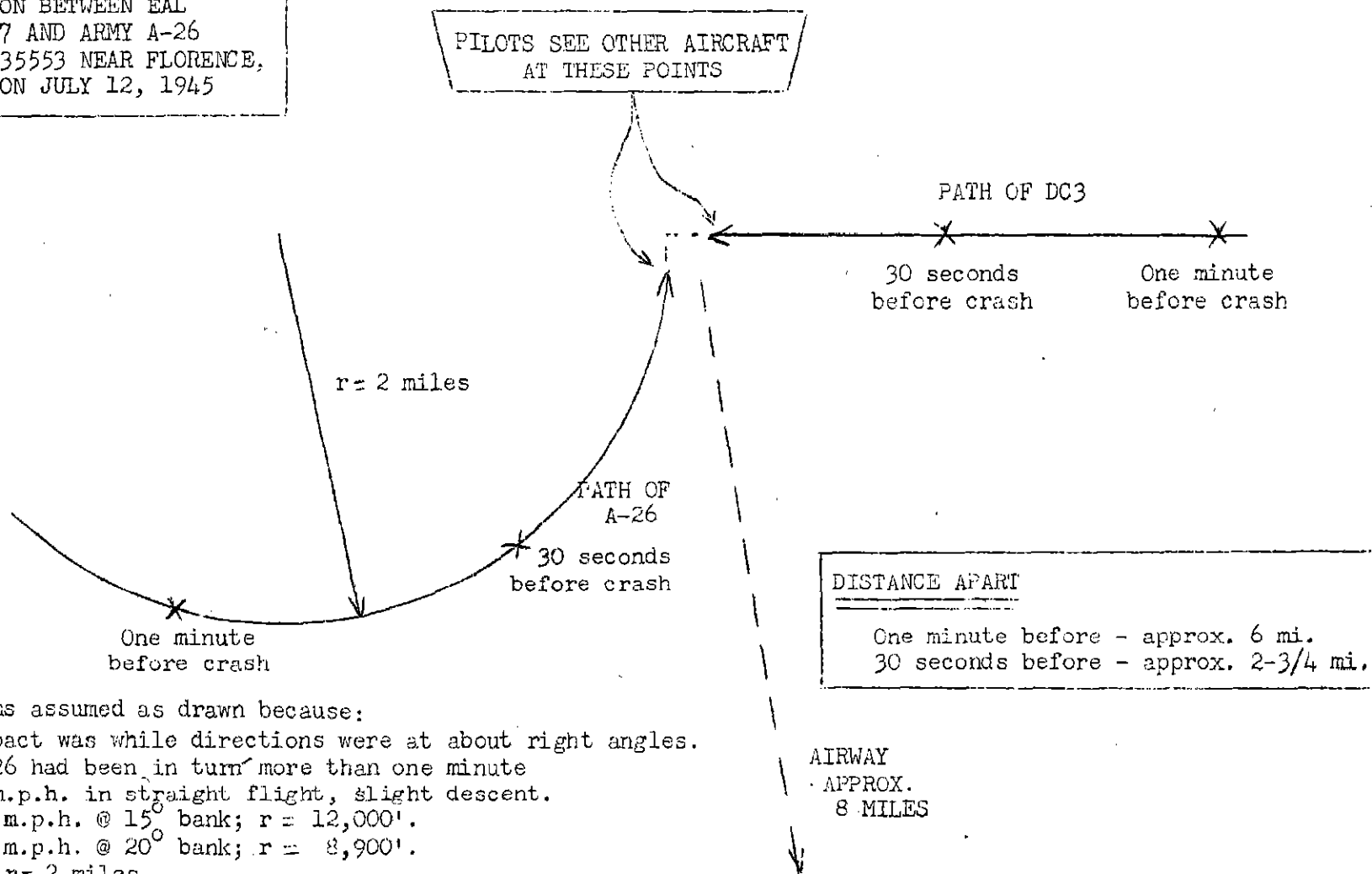
/s/ Harllee Branch

/s/ Oswald Ryan

/s/ Josh Lee

PLAN VIEW

COLLISION BETWEEN EAL
NC 36757 AND ARMY A-26
NO. 44-35553 NEAR FLORENCE,
S. C., ON JULY 12, 1945



1. Flight paths assumed as drawn because:
 - (a) Impact was while directions were at about right angles.
 - (b) A-26 had been in turn more than one minute
2. DC3 @ 170 m.p.h. in straight flight, slight descent.
3. A-26 @ 220 m.p.h. @ 15° bank; $r = 12,000'$.
4. A-26 @ 220 m.p.h. @ 20° bank; $r = 8,900'$.
5. \therefore Assume $r = 2$ miles.
6. A-26 would make about 107° of a 2-mile radius turn in one minute.

NOTE: This diagram is based on collision during flight at right angles. There is some evidence to indicate that the angle of contact was slightly more than 90° . However, if this were the case the above figures would not be changed substantially.