

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

## A C C I D E N T   I N V E S T I G A T I O N   R E P O R T

Adopted: April 11, 1945Released: April 12, 1945

## DELTA AIR CORPORATION - OCTOBER 28, 1944

Taking off on its regular flight from Jackson, Mississippi, while en route from Fort Worth, Texas, to Atlanta, Georgia, on October 28, 1944, Delta Flight 4 received damage to both propeller tips. Not aware of the damage, the pilot continued the take-off and flight to Atlanta. There was no injury to passengers or crew.

A company flight superintendent was riding in the jump seat for the purpose of becoming familiar with the route. During the take-off the captain was demonstrating to the flight superintendent a certain peculiarity of the altimeter. As the take-off run proceeded, the captain called the first officer's attention to the flickering of the landing gear position indicator light and then proceeded to point to the altimeter. At some time during the period in which the captain was making these motions, the landing gear was raised, and the propeller tips struck the runway.

Based on the evidence produced in this investigation, the Board has determined that a premature raising of the landing gear, possibly due to the first officer's misinterpretation of the captain's motions, was the probable cause of the accident.

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This report was prepared from the Board's investigation and the hearing which was held at Atlanta, Georgia, November 4, 1944.

## NARRATIVE DESCRIPTION OF FLIGHT AND ACCIDENT

Delta's Flight 4 departed from Forth Worth, Texas at 8:35 p.m. October 27, with Atlanta, Georgia, as its destination. The flight proceeded normally and shortly after midnight an intermediate stop was made at Jackson, Mississippi. At this stop Mr. Rainouard, Delta's flight superintendent, who was on the flight for the purpose of familiarization and who had been riding in the passenger compartment, got into the jump seat by prearrangement with the captain. They had been discussing a sub-normal reading of the altimeter which the captain had noticed occurring during take-off, and he was going to demonstrate it to Rainouard.

The plane was taxied to take-off position at the south end of the north-south runway and after the cockpit check, the engines were run up, the propellers set to the low pitch position and the lock released from the landing gear latch control, according to company procedure. Upon receiving clearance, the captain began the take-off in which he used 45 inches of manifold pressure. As the take-off run progressed the captain noticed the landing gear green light flickering and drew the first officer's attention to it by touching him on the shoulder and pointing to the light. This flickering was of no particular significance as it was due merely to vibration overcoming the tension of a weak spring in the electrical contact mechanism which causes the contact point to separate momentarily, thereby blinking the landing gear green light. A slight movement of the valve handle stops this flickering.

The captain then put his finger on the altimeter to show Rainouard the sub-normal reading and held the plane on the ground for a longer period than usual in order to demonstrate this action at a higher speed. Immediately thereafter the aircraft yawed to the left and the left engine momentarily dropped about 100-200 r.p.m. Simultaneously there was a "hesitancy" in forward speed and vibration was noticed in the left engine.

When the plane had reached an altitude of 1000 feet the captain asked the first officer if the landing gear was up. A visual check indicated that the gear was in the retracted position, although according to the captain he had not given the "up gear" signal. The signal as used by Captain Smith is a shrill whistle through his teeth accompanied by the hitch hiker's "thumb up" signal. (Delta's instructions, outlined in a bulletin issued May 21, 1943, were to the effect that a visual signal was not to be used, but only the spoken words "gear up" were to be given by the captain making the take-off.)

During the climb the captain opened the left window and detected an unusual noise which led him to believe a valve had stuck or an exhaust manifold gasket had blown out. He instructed the first officer to check the exhaust for "flickering flame and white smoke." The first officer

complied and reported no irregular condition. Upon the request of the captain, Rainouard went to the passenger compartment and through the window observed the collector ring to see if there were any leaks. He could see nothing which would indicate irregularity. Although he used a flashlight, neither he nor the other members of the crew noted the reflected light disc of the propeller.

About ten minutes after take-off the captain contacted the Atlanta dispatcher advising the latter that "slight engine trouble" had been encountered. He then requested a change in flight plan, to fly at 5000 feet instead of 3000 feet, and permission to pass up Birmingham, Alabama. He explained that having no passengers listed as "on" or "off" for that stop it would be advisable not to land there with an improperly functioning engine, especially in view of the hills surrounding the Birmingham Airport. The change in flight plan was approved by Atlanta. After cruising altitude had been reached power was reduced further and the engine then seemed to operate normally. The flight from Jackson to Atlanta, 370 miles distant, was made non-stop without further difficulty, and Flight 4 arrived at its destination seven minutes ahead of schedule.

## THE BOARD'S INVESTIGATION

### Investigation Initiated

The Atlanta Office of the Civil Aeronautics Board received notification at 10.58 a.m., October 28, 1944 and the Board initiated an investigation in accordance with the provisions of Section 702 (a) (2) of the Civil Aeronautics Act of 1938, as amended. Fred G. Powell, Senior Air Safety Investigator, and M. P. Hanscom, Air Safety Investigator, both of the Board's Atlanta Office, made an immediate examination of the damaged propellers, the radio antenna, and the runway markings made by the propeller tips at the Jackson Airport.

### Hearing

In connection with the investigation the Board ordered a public hearing in which William K. Andrews, Chief, Investigation Section, Safety Bureau of the Board, served as presiding officer. The hearing was held November 4, 1944 at the Municipal Airport, Atlanta, Georgia, with the following personnel of the Safety Bureau staff participating. Fred G. Powell, Senior Air Safety Investigator, M. P. Hanscom, Air Safety Investigator; and Kenneth C. Sonner, Air Safety Specialist (Powerplants).

## SUMMARY AND ANALYSIS OF EVIDENCE

### Air Carrier Certification Status

At the time of the accident Delta Air Corporation, Inc., a Louisiana corporation, 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 engage in air transportation with respect to persons, property and mail between various points in the United States, including Fort Worth, Texas, and Atlanta, Georgia.

### Flight Personnel Employment and Experience Record

The crew of Flight 4 consisted of Edward Freeman Smith, captain; Bobbie Lee Mullis, first officer; and Dorothy Elizabeth Arnall, stewardess. Delta's flight superintendent, Emmett Alexander Rainouard, who was on a Fort Worth-Atlanta route familiarization trip, was riding in the jump seat.

Captain Smith, age 38, of East Point, Ga., was employed by Delta on March 18, 1941, was promoted to reserve captain on February 19, 1943 and to captain on July 16, 1944. He held an airline transport pilot certificate with a multi-engine land, 1000-3000 h.p. rating and an aircraft and engine mechanic certificate. He had accumulated approximately 5810 hours of flight time, including 2539 hours on DC3 equipment and 1749 hours as captain and reserve captain. His last physical examination, required by the Civil Air Regulations, was accomplished on July 20, 1944.

First Officer Mullis, age 32, of Atlanta, Ga., was employed by Delta on March 9, 1944. He held a commercial pilot certificate with single-engine land, 0-315 h.p. and instrument ratings. He had flown approximately 1648 hours, including about 648 on DC3 equipment. His last physical examination, required by the Civil Air Regulations, was accomplished on January 26, 1944.

Stewardess Arnall had been in the employ of Delta since June 19, 1944.

Emmett Alexander Rainouard, the fourth member of the crew and chief flight superintendent for Delta, was certificated as a dispatcher.

Both the captain and the first officer were properly certificated and physically qualified for their duties in connection with the flight involved.

### The Aircraft

The aircraft, originally manufactured in December 1942 as an Army model C-49-J, was released by the Army to Delta on June 27, 1944 having operated 4134 hours in cargo carrying and flight training operations. It was converted at the Douglas Aircraft factory to a DC3-G202A and was certificated as a commercial plane on September 11, 1944. Since its reconversion it had been flown 561 hours, therefore, the total time on the aircraft was 4695 hours. The plane was equipped with two Wright G202A engines and two Hamilton Standard three-bladed hydromatic propellers. The weight of the aircraft at the time of take-off from Jackson was well under the maximum allowable.

## Examination of the Propellers and Runway

Upon arrival at Atlanta, it was noticed that both propellers were damaged. An examination revealed that the left propeller had from six to eight inches of the blade tips bent forward about 90°. The outer surfaces of the bent portions were abraded parallel to the path of rotation and considerable metal had been worn away. The right propeller blades were not bent, but about 5/8 inch of each tip was worn away. There was a misalignment of the two sections of the crankshaft of the left engine and the tips of the whip antenna, which extended below the fuselage, were found abraded.

Examination of the runway at Jackson disclosed that both propellers had made contact with the runway during the take-off. The left and right propellers had apparently contacted the concrete surface 1940 and 2045 feet respectively from the south end of the runway. Marks which contained metallic deposits from the propeller blades were spaced at approximately 2-foot intervals. There was a total of 95 marks for a distance of 182 feet made by the left propeller and 85 marks for a distance of 160 feet made by the right propeller.

### DISCUSSION OF PERTINENT FACTS AND THE FINDINGS

It is quite evident that the landing gear was raised shortly after the captain endeavored to draw the first officer's attention to the flickering of the landing gear green light, and about the time the captain was pointing out the altimeter reading to Rainouard. As the landing gear retracting mechanism was operating properly after the accident and no evidence was found of any prior malfunctioning of this mechanism, it is reasonable to conclude that it was operated by one of the crew, probably the first officer. This is supported by the admission that he might have misinterpreted the captain's gestures as a signal for "gear up." However, he stated that he did not remember manipulating the landing gear retracting controls at any time during the take-off. The captain testified that he did not give any instruction for retracting the gear. Rainouard, in a position behind the two pilots, stated that he was absorbed in watching the behaviour of the altimeter and did not notice the actions of either the captain or the first officer. He obviously did not operate the landing gear retracting mechanism, nor does he recall having seen it operated.

From the testimony of the three crew members it is evident that during the take-off the two pilots were performing their assigned functions in a manner not reflecting the fullest coordination and not entirely according to company procedure. The responsibility for the efficient execution of company cockpit procedure rests with the captain. Had he been following the standard company procedure of giving a verbal instruction for retracting the landing gear, there would have been little likelihood that the first officer would have misinterpreted his gestures.

## Findings

1. Delta's Flight 4 was normal in every respect until its departure from Jackson, Mississippi.
2. Chief Flight Superintendent Rainouard constituted the fourth member of the crew and occupied the jump seat. He was on board for the purpose of route familiarization.
3. The take-off run at Jackson was extended beyond normal by the captain.
4. The captain did not conform to the company's established cockpit procedure during the take-off. His gestures in pointing to the altimeter and in calling the first officer's attention to the flickering of the landing gear green light was admittedly confusing to the first officer.
5. The captain did not issue specific instructions to the first officer to raise the landing gear.
6. There occurred at Jackson a premature retraction of the landing gear by some member of the crew during take-off with resultant damage to the tips of all propeller blades and misalignment of the two crankshaft sections of the left engine.
7. There was no evidence found that the landing gear retracting system was malfunctioning, nor that there had been any malfunctioning or failure of any part of the airplane at the time of or prior to retraction of the gear.
8. Due to the captain's belief that engine trouble developed after take-off from Jackson, the trip passed up the next scheduled stop at Birmingham, Alabama, and proceeded directly to Atlanta, Georgia.
9. The captain, having had indication of malfunctioning of the left engine, displayed poor judgment in continuing the flight to Atlanta, 370 miles distant.

### PROBABLE CAUSE

The probable cause of this accident was a premature retraction of the landing gear, possibly due to the first officer's misinterpretation of the captain's unorthodox gestures, together with an unusually long take-off run.

A contributing factor was failure of the captain to conform to standardized company procedures.

BY THE CIVIL AERONAUTICS BOARD:

/s/ L. Welch Pogue  
L. Welch Pogue

/s/ Edward Warner  
Edward Warner

/s/ Harilee Branch  
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