Docket No. SA-103 File No. 1063-45

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: July 24, 1945 Released: July 24, 1945

PAGE AIRWAYS, INC. - WASHINGTON - APRIL 27, 1945

Summary

Power interruption during a take-off climb induced a forced landing resulting in death to six passengers and injury to five others and to the crew of two at the National Airport, Washington, D. C., at approximately 1240 EWT on April 27, 1945. The aircraft was completely destroyed by impact and resultant fire.

Just after take-off a loss of power occurred and the captain landed straight ahead. The aircraft bounced three times before it maintained ground contact and then rolled into a drainage ditch near the upwind end of the runway where it burned.

The probable cause of the accident was engine failure during a critical period of take-off, following which the pilot executed an emergency landing under unfavorable conditions. Contributing factors were the strong gusts and ground turbulence which prevailed at the time. However, the seriousness of the accident was due to the presence of a deep ditch near the runway.

This report was based on the Board's investigation and a hearing held at Washington, D. C., on May 4, 5 and 7, 1945.

NARRATIVE DESCRIPTION OF FLIGHT AND ACCIDENT

Lockheed NC 33328 departed the 36th Street Airport, Miami, Florida, for New York, N. Y., via the National Airport, Washington, D.C., about 0505 E"T, approximately one hour and 37 minutes before sunrise 1/, on April 27, 1945. Aboard were 14 passengers, their baggage and a reported 525 gallons of fuel. The weight of the aircraft, as estimated by company personnel, was approximately 18,500 lbs. (nearly 900 lbs. in excess of the allowable weight) and the disposable weight had been arranged by the company agent to give an estimated satisfactory center of gravity position. Except for generator trouble, the flight progressed uneventfully in contact weather with arrival at Washington at 1030 where a normal landing was made.

At Washington three passengers and their baggage were deplaned and the aircraft was refueled with 376 gallons of 91 octane gasoline. Mechanics of one of the scheduled air carriers operating from this airport made repairs on one of the generators. The other generator could not be repaired in the time available and was left inoperative.

About 1235 the aircraft, with 11 passengers and baggage, was taxied to the downwind end of the NW-SE runway for the next leg of the flight to New York. It was estimated by the crew that the weight of the aircraft was 17,300 lbs. and that the center of gravity was within allowable limits. The captain ran up and tested both engines and the copilot asked and received take-off permission from the control tower. The wind was averaging 22 m.p.h. from the general direction of 315° and was gusty.

Take-off was started on Runway 33 and the aircraft became airborne after traveling approximately 1,000 feet. Upon gaining an altitude of 10 or 15 feet the captain ordered "gear up" and the copilot complied. A few seconds later, when the gear was up, or nearly up, the captain sensed a power interruption with the aircraft yawing to the left. Concurrently he called out "Single engine", throttled both engines, ordered the landing gear down and lowered the nose of the aircraft slightly. After a few seconds had elapsed the landing gear was fully down. At the time of throttling the engines the aircraft was approximately one-half way down the 5200-foot runway and was at an altitude of which the most plausible consensus is 30 feet. First contact with the ground was made on the same runway at a speed the pilot estimated as 100 miles per hour. The aircraft bounced to an estimated height of 15 or 20 feet and made contact again on the sodded ground a few feet to the right side of the same runway. From this point on it twice again left the ground for distances of 189 and 728 feet. Brakes were applied intermittently during the second, the third, and the final contact with the ground. At some undetermined point following initial contact the captain applied 20° of flap. Decelerating rapidly after the final contact the aircraft continued to roll to the right of the runway, diverging slightly, for a total distance of about 535 feet. It passed beyond the end of the runway and when an estimated 60 or 70 feet from a large drainage ditch nearly at right angles to the course, the pilot attempted to groundloop to the right. However, the plane turned

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1/ Official sunrise at Miami on April 27, 1945 was 0642 E"T.

only about 20° to the right and rolled into the ditch, left wheel first, at an estimated speed of 10 or 15 m.p.h., about 95 feet to the left of a boundary marker. It rolled down the sloping side turning parallel with the ditch and stopped abruptly at the concrete-lined bottom where it immediately burned.

Both pilots and persons nearby extricated passengers from the flaming wreckage and were soon assisted by U. S. Army and National Airport fire fighting and medical aid stationed on the field

THE BOARD'S INVESTIGATION

Notification of the accident was received by the Washington Office of the Civil Aeronautics Board about 1315 EWT, April 27, 1945, and an investigation was initiated immediately in accordance with the provisions of Section 702 (a) (2) of the Civil Aeronautics Act of 1938, as amended. H. G. Myers, Air Safety Investigator at Large, and A. E. Cabana, Senior Air Safety Investigator of the New York Office, arrived at the scene of the accident about 20 minutes later and found the wreckage under U. S. Army guard. Other personnel of the Board's Safety Bureau subsequently arrived and assisted in the investigation.

Hearing

A public hearing was held on May 4 and 5 at the Departmental Auditorium, Washington, D. C., and on May 7 at the National Museum, Washington, D. C. W. K. Andrews, Chief, Investigation Section of the Safety Bureau, presided. Other Safety Bureau personnel participating were: H. G. Myers, A. E. Cabana, Jesse K. Fenno, Chief, Investigation Division; R. B. Bancroft and N. G. Crowley, Report Editors; Fred G. Powell, Senior Investigator, J. O. Fluet, Investigator; and W. E. Koneczny, G. M. French and K. C. Sonner, Bureau Specialists on Aircraft, Meteorology and Powerplants, respectively. Also participating were Philip Schleit, Albert Grisard and Merrill Armour of the General Counsel's Office of the Board.

Flight Personnel

Captain John W. Decker and Copilot Edwin A. Sanford comprised the crew.

Captain Decker, age 30, held a current airline transport pilot certificate with ratings for single and multi-engine land airplanes up to 3000 h.p. His last physical examination required by the Civil Air Regulations was passed on November 2, 1944. He had flown about 3,115 hours of which some 65 hours had been for Page Airways in the aircraft involved. Decker was employed by Page Airways on April 3, 1945. He had a diversified aeronautical background including about two years as co-pilot on a scheduled air carrier and one and one-half years as a test pilot for an aircraft manufacturer just prior to going with Page Airways.

Copilot Sanford, age 30, held a currently effective commercial pilot certificate with ratings for single-engine land airplanes up to 340 h.p., instrument and flight instructor. His last physical examination required by the Civil Air Regulations was passed on March 29, 1945.

He had flown about 2600 hours. Sanford was employed by Page Airways on April 22, 1945, and the flight from Miami to Washington was his first for that company.

The Aircraft

Manufactured in September, 1942, as an Army Model C-56E, the aircraft was known commercially as a Lockheed Lodestar, NC 33328, serial number 2221. It had been used by the Army for transporting personnel and 14 passenger seats were installed. Page Airways acquired possession of the plane on March 23, 1945, under a purchasing arrangement whereby it remained registered temporarily by the Civil Aeronautics Administration in the name of Defense Plant Corporation.2/

When Page Airways took possession the aircraft had been flown about 1570 hours. From that time until the accident on April 27 Page had flown it about 160 hours. It was powered by two Wright Cyclone G202A engines which had 320 hours since Army overhaul. Total times were approximately 1051 hours and 1596 hours for the left and right engines, respectively. Hamilton Standard hydromatic propellers were installed.

On March 29, 1945, the Civil Aeronautics Administration certificated the plane for commercial use with a standard weight limitation of 17,605 lbs. and restricted it to day flight only because of lack of flare equipment. Specified limits for the position of the center of gravity were from 28.5% to 39.0% of the mean aerodynamic chord.

Examination of the Wreckage

Examination of the wreckage disclosed no indication of failure of the aircraft's structure or flight controls. Inspection of the braking system showed that the brakes had functioned normally which was further substantiated by normal braking during the landing at Washington. However, there had been a powerplant failure.

Examination of the right engine showed that the upper valve spring washer of the intake valve on No. 1 cylinder had failed. It had cracked radially allowing the split type valve locks to be forced out and the valve to go within the cylinder, an occurrence known as "swallowing a valve."

Spark plugs of both engines had gaps which were close to the accepted maximum of .020 inches. Two of the spark plugs of the left engine were found to be defective. Spark plugs of the other engine were so damaged by fire that their prior electrical efficiency could not be determined. However, two had gaps of almost .030 inches.

It appeared that the Army overhauls and the subsequent maintenance of the engines had not been up to usual commercial standards, as evidenced by the fact that the valve mechanism assemblies throughout both engines were not uniform in assembly or parts. Throughout both engines washers of a condemned type were found. This condemnation will be explained later in this report.

2/ Defense Plant Corporation is a subsidiary corporation of the Reconstruction Finance Corporation.

DISCUSSION AND FINDINGS

A 100-hour engine inspection, as required by CAA, had been performed by certificated Page Airways personnel when Page acquired the aircraft. According to company testimony the next 100-hour check was likewise carried out. This failure was of such a nature that it would not necessarily have been discovered during the course of a 100-hour inspection which does not involve disassembly. It should have been discovered during the course of an overhaul. It is not possible to determine whether the crack had started previously or occurred suddenly during the take-off when conditions most conducive to such a failure existed.

Page Airways was engaged in carrying revenue passengers primarily between Rochester, N. Y., and Miami, Florida, in what company personnel termed a "non-scheduled charter service."3/ Lockheed NC 33328 had been flown approximately 160 hours during the 35 days it had been in Page Airways' possession. This time was accumulated almost entirely between upper New York State and Miami. The accident occurred on the return portion of the tenth round trip.

The drainage ditch previously mentioned is on airport property and is about 66 feet wide and about 15 feet deep with a concrete lined section at the bottom 18 feet wide by 4 feet deep. It is 98 feet from the end of Runway 33 to the near side of this ditch which does not have a raised edge or other distinguishing characteristic. Close to the edge of the ditch are standard colored conical airport boundary markers, placed about 250 feet apart, which definitely mark the limit of the usable area. They are suitably conspicuous but do not warn of the declivity beyond. Although Captain Decker had flown in and out of National Airport on a number of occasions he testified that he was unaware of the existence of this ditch and stated that he could have prevented the accident had he known it was there. This ditch, although beyond the marked limits of the field, [illegible] constitutes a hazard to an overshooting aircraft and probably contributed to the seriousness of this accident.

Captain Decker's testimony that the aircraft yawed to the left at the time of the power interruption is inconsistent with loss of power of the right engine. However, this can be explained by the strong and unusually gusty wind which prevailed at the time. During the period

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3/ By definition (Section 292.1 of the Economic Regulations of the CAB)".. ... . any operation shall be deemed to be non-scheduled if the air carrier does not hold out to the public by advertisement or otherwise that it will operate one or more airplanes between any designated points regularly or with a reasonable degree of regularity upon which airplane or airplanes it will accept for transportation, for compensation or hire, such members of the public as may apply therefor or such express or other property as the public may offer....."

from ten minutes before the accident to five minutes after it the wind was from an average northwest direction, fluctuating from 20 to 25 m.p.h. with gusts from 13 to 38 m.p.h. A strong gust occurring coincidentally with the power loss could have caused the yawing to the left.

Previous failures of valve spring washers of this type had been experienced on other engines of this make and model. There were two models of the subject washer of slightly differing dimensions and other characteristics which were known to have failed. Army, Navy and other known users of this engine had this matter called to their attention by Wright Aeronautical Corporation. On February 27, 1943, the Army took corrective action by issuing a technical order for the replacement of one of these aforementioned types. On November 13, 1943, the Navy took corrective action in reference to both types. The failed washer was of the type which the Army Air Forces did not undertake to replace. Subsequent to this accident Wright Aeronautical Corporation issued a bulletin on identification of existing defective washers and recommended their immediate replacement with a later type.

A number of witnesses observed smoke and flame coming from the aircraft during the take-off climb. This is a natural result of this type of engine failure which causes malfunctioning of both the induction and exhaust sysems. Also, torching resulted from the sudden throttling of both engines which were being operated on a take-off rich mixture.

At the time Certain Decker realized the loss of power he had about 30 feet of altitude, about 95 m.p.h. airspeed and about 2700 feet of usable remaining runway. There were there possibilities which the pilot could have tried: - continue flight on one engine, land with wheels up or land with wheels down. He elected to do the latter. 4/ First contact with the ground was made at a speed and in an attitude which prevented the maintenance of continuous ground contact with a resultant loss of braking. This condition was undoubtedly aggravated by the unusual gustiness. Furthermore, the application of the flaps after the first ground contact could and probably did cause the aircraft to stay in the air longer than it otherwise would have, thereby further lessening braking distance.

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

1. The aircraft was properly certificated for day operation but had departed from Miami before sunrise.

2. The pilots were properly certificated and rated.

3. The aircraft was loaded above the maximum allowable weight on leaving Miami. The exact weight on leaving Washington could not be determined due to Page's failure to keep an adequate loading schedule.

4/ Captain Decker stated that he had landed the subject aircraft on several occasions "using 2/3 or 3/4 of a 2800-foot runway."

4. The center of gravity of the aircraft could not be determined at the time of departure from either Miami or Washington due to Page's not using an accepted method of load computation and distribution.

5. The maintenance of the engines was not in accord with accepted standards.

6. The fuel used was of the proper grade.

7. The engine failure was due to a cracked valve spring washer which part had been condemned by the engine manufacturer

8. The usable part of the airport was marked by standard boundary markers, suitably conspicuous but not indicating the presence of the drainage ditch which proved to be a hazard in this instance

PROBABLE CAUSE

On the basis of all the evidence available the Board determines that the probable cause of this accident was engine failure during a critical point in the take-off following which the pilot executed an emergency landing under unfavorable corditions. Contributing factors were the strong gusts and ground turbulence which prevailed at the time. However, the seriousness of the accident was due to the presence of a deep ditch near the runway.

BY THE CIVIL AERONAUTICS BOARD.

/s/ L. Welch Pogue

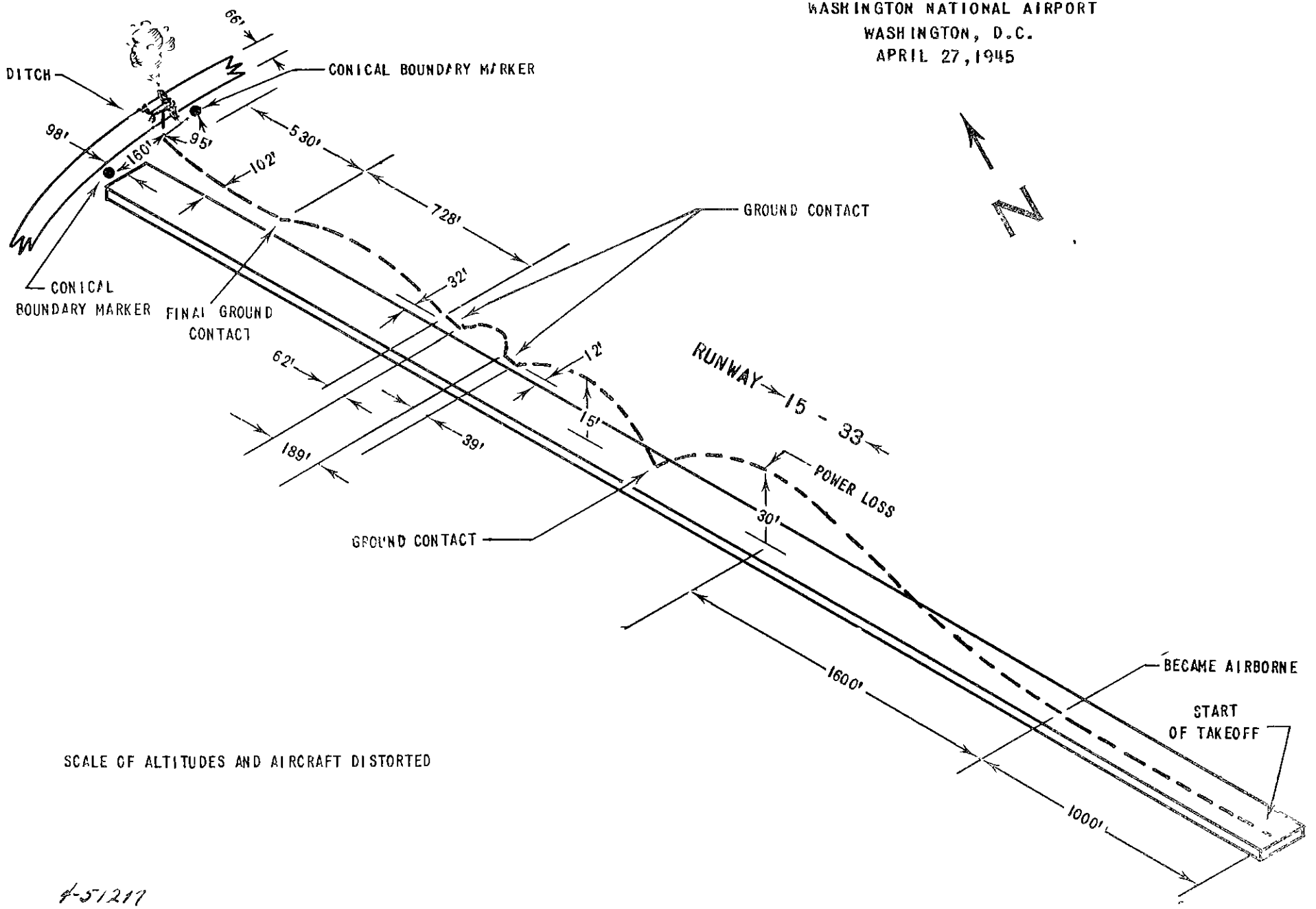
/s/ Edward Warner

/s/ Harllee Branch

/s/ Oswald Ryan

/s/ Josh Lee

PAGE AIRWAYS ACCIDENT
LOCKHEED "LODESTAR" NC 33328
WASHINGTON NATIONAL AIRPORT
WASHINGTON, D.C.
APRIL 27, 1945



SCALE OF ALTITUDES AND AIRCRAFT DISTORTED

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