CIVIL AERONAUTICS BOARD

ACCIDENT INVESTIGATION REPORT

Adopted: December 13, 1950 Released: December 14, 1950

NORTHWEST AIRLINES, INC., MINNEAPOLIS, MINN., MARCH 7, 1950

THE ACCIDENT

Northwest Airlines' Flight 307, a Martin 202, aircraft N-93050, crashed 4-3/8 miles west of the Twin Cities Airport,[1] Minneapolis, Minn., at 2059,[2] March 7, 1950. The 10 passengers and crew of three were killed The aircraft was completely destroyed

HISTORY OF THE FLIGHT

Flight 307 originated in Washington, D. C., at 1230, March 7, 1950, destined for Winnipeg, Manitoba, Canada Scheduled intermediate stops included Detroit, Mich . Madison, Wis., Rochester, Minn., and Minneapolis-St Paul. Donald B Jones was captain, William T McGinn, copilot; and Mary Kennedy, stewardess With the exception of an hour and 23 minute delay at Detroit, required for the replacement of a ring seal in the hydraulic system, the flight proceeded in a routine manner to Madison, Wisconsin After arrival at Madison the aircraft was serviced with 1,010 gallons of fuel and 38 gallons of oil. Also on board were 10 passengers and 1,799 pounds of cargo which resulted in an aircraft weight of 36,842 pounds This weight was well within the allowable limit of 39,100 pounds, and so far as is known, the aircraft was properly loaded.

Weather information available to the flight prior to its departure from Madison showed that Rochester, 75 miles south southeast of Minneapolis, was reporting a ceiling of 700 feet with visibility of five miles, and that Minneapolis was reporting a ceiling of 900 feet with visibility of 1/2 mile.[3] In addition, there was fog and blowing snow at these stations Turbulence was expected in the clouds, and icing above the freezing level of 8,000 feet. The trip was planned to Minneapolis at an altitude of 4 000 feet, the schedule stop at Rochester being made contingent upon weather conditions at the time of the flight's arrival Madison, Wis., and Jamestown, N Dak , where weather conditions were well above landing minimums, were designated as alternate airports

Flight 307 arrived over Rochester at 2023, and because there was light freezing rain, did not land Twelve minutes later the flight made a routine report to company radio that it was over Stanton which is a radio beacon 30 miles south of the Twin Cities Airport at Minneapolis, and at 2041 contacted Minneapolis Approach Control for landing clearance

The tower advised Flight 307 of existing weather conditions There was a precipitation ceiling of 900 feet, visibility was variable 1/2 to 3/4 of a mile, and the wind was from the north 27 miles per hour with gusts up to 40 miles per hour. The tower informed the flight that there had been two electric power failures at the field, and that if no further communication were received from the tower, it would be in all probability the result of another power failure The flight was also told that the ILS was serviceable, but that it had not been flight checked

As Flight 307 approached, another NWA flight, a Boeing 377, was standing at the approach end of the instrument runway, Runway 35, checking engines prior to flight Takeoff clearance was given to the Boeing 377 When it had proceeded half-way down the runway, Flight 307 reported that it was over the outer marker, which was 4.7 miles south of the approach end of the runway. The high intensity runway lights were increased in intensity, their coning device was set to

[1] The Minneapolis-St Paul International Airport

[2] All times referred to herein are Central Standard and based on the 24-hour clock

[3] These weather conditions were above the minimum requirements Night landing minimums for NWA at Minneapolis, using ILS were ceiling 300 feet and 3/4 mile visibility, or ceiling 400 feet and 1/2 mile visibility

1/2 mile, the prevailing visibility at the time, and Flight 307 was cleared to land.

Flight 307 was not seen from the tower during its approach, but it was heard to pass overhead at which time the controllers received the call, "I have got to get in " Clearance was again given to land, following which the flight advised that it would climb to 2,400 feet on the northwest course of the Minneapolis radio range. After a pause, the flight transmitted, "We are going in—we are going in."

After the aircraft had flown over the field, it was observed flying straight and level 3 8 miles northwest of the airport. A wing was seen to fall. Then, the aircraft was observed to dive almost vertically from an altitude of about 300 feet, and crash into a residence in the city of Minneapolis Fire which started immediately after the crash consumed the house and much of the aircraft wreckage. All of the 13 occupants of the aircraft and two of the occupants of the house were killed

INVESTIGATION

The main body of the wreckage was located in the basement of the residence into which the aircraft crashed. This home was located 4-3/8 miles northwest of the Twin Cities Airport. The left wing, outboard from Station 252, was located at the foot of the Washburn Park water tower, 3.8 miles northwest of the field. This wing section was approximately 24 5 feet long. Both the upper and lower skin of this section showed that the wing had been torn between Stations 252.040 and 262.290 as far rearward as the auxiliary spar. The end of the rear spar showed that the spar had been broken in two from being twisted upward and rearward Tears and breaks further showed that this wing section after being torn or cut through the forward portion had rotated upward and rearward, and as a result of this twisting action, separated from the remainder of the wing

A piece of the lower front spar cap from the left wing was found 300 feet north of a tapered steel flagpole which was located at the time of this accident near the entrance of the National Soldiers Cemetery This pole was 4,180 feet south of the approach end of Runway 35 and 650 feet west of the center line of that runway. The top extended 70 feet above the ground, but it was 126 feet below the low limit line of the glide path It was well marked by red neon lights, which were functioning at the time of the accident The pole was eight inches in diameter at the base, and 3-5/8 inches in diameter at the top Wall thickness was 1/4 of an inch

Examination of the pole disclosed that the aluminum paint from two to four feet from the top had been scraped from the south curvature, and that the pole had been bent in an azimuth of 17 degrees true. A large ornamental American eagle which had been mounted on the top was found 20 feet south of the pole's base while the red neon lights were found 40 feet to the north It was apparent that Flight 307 had struck the pole during the attempted approach

The location of aircraft parts, the bend in the flagpole, and the statements from witnesses who observed the aircraft on its approach to the airport for landing, as well as those in the control tower who heard the aircraft pass overhead fixed the flight path of the aircraft When the aircraft struck the flagpole it was 128 feet below the ILS glide path, 650 feet west of the center line of the runway, and it was flying a course 17 degrees to the right of the runway heading From this point it turned left sufficiently to pass over the control tower which was located 1 6 miles north of the flagpole The aircraft then flew northwesterly 3 8 miles where the left wing section, described above, became totally separated from the aircraft and dropped to the foot of Washburn Park water tower Then the aircraft progressed westerly an additional 2,640 feet before striking the residence located at 1116 West Minnehaha Highway

An examination of the actuating mechanism for the landing gear and landing flaps showed that both were retracted at the time of the crash

Records from the U S. Weather Bureau show that the weather at the Twin Cities Airport was substantially the same as the tower reported it to be There was a 900-foot precipitation ceiling, sky obscured, with visibility reduced to 1/2 mile variable by blowing snow. The wind was from the north at 27 miles per hour with gusts to 40 miles per hour According to observations of other pilots who made approaches to the Twin

Cities Airport immediately before and after the accident, slant visibility from the air was relatively good, the airport being partially visible from the outer marker, 4 9 miles south of the approach end of Runway 35 Without exception, these pilots completed their approach to the field from various points between the outer and inner markers by visual reference to the ground None had any difficulty in seeing the high intensity Bartow lights which outlined the boundaries of the runway. Below 2,500 feet the air was cold and dry which provided little possibility for icing. However, the pilots who landed during the period consistently reported that there was a great deal of turbulence over the approach path.

As previously stated, a Boeing 377 was standing at the approach end of Runway 35 for an engine run-up check just before Flight 307 started its landing approach The crew in the Boeing had been permitted by the tower to taxi onto the runway into takeoff position, since snow and ice on the taxi strip permitted the aircraft to slide forward when throttles were advanced Tower personnel stated in effect that during the engine run-up, blowing snow from the Boeing's propellers along with snow carried by the high wind obscured the lights at the south end of the runway, but that they were able to observe all of the high intensity runway lights and the Boeing on its takeoff roll According to tower records, Flight 307 was cleared for landing approach at 2045 The flight reported over the outer ILS marker at 2053, and was heard to fly over the tower four minutes later at 2057. Since the Boeing was on takeoff roll, abeam of the tower at 2053, there was a four minute separation between the two aircraft

At 1936 there had been an electrical failure that cut off power in both the normal and emergency lines which supplied the airport As a result, all field lights and landing facilities on the airport were inoperative Power was restored at 1955 after which all lights and landing facilities were again made operative From the time that power was restored until the time of the accident, no abnormal operation was noted in any of the instrument landing facilities.

None of the pilots who made approaches into the field before or after the accident observed any abnormalities in the airport's ILS equipment One pilot did say that the flag showed on his ILS cross pointer instrument just before his landing approach was completed This would occur as a result of either a malfunction of the equipment in the aircraft, or as a result of the ILS transmitters being turned off All of the monitoring records, as well as statements from control tower personnel who observed the monitoring equipment in the tower, were to the effect that the ILS equipment operated without interruption, except during the period of power failure, until 2246. No defect was found in the airborne ILS equipment in the aircraft flown by the pilot who made the complaint

Both the glide path and the localizer transmitters are guarded by monitoring devices These devices automatically turn the transmitters off if they do not operate within accepted limits Accordingly, a flag showing on the ILS cross pointer instrument would indicate only that the glide path or localizer transmitter were off the air, and not that there was a deviation from a normally projected instrument flight path.

At 2246, one hour and 47 minutes after the accident, the glide path transmitter was shut off automatically by its mechanical monitor It was determined the following day that the difficulty was not in the glide path transmitter, but in a snow condition which affected only the monitor. As far as can be determined, there was no defect in the operation of any of the ILS equipment, or in any of the other landing facilities on or near the Twin Cities Airport at the time of the accident Furthermore, no defects are known to have existed in any of the aircraft's flight instruments or related equipment.

Captain Jones had a total of 7,619 hours of flying time, of which 988 were in Martin 202 equipment. He was considered by his company to be exceptionally proficient in all phases of flying, particularly in executing ILS approaches He had been designated as a CAA check pilot, and had been used by the company to check out other pilots. He had made over 200 ILS approaches to the Twin Cities Airport [4]

[4] For professional data concerning the pilot and copilot, see Supplemental Data

ANALYSIS

It is clear that no aircraft engine failure was involved in this accident since none was indicated by the investigation, and since the aircraft flew six miles after striking the flagpole It is also indicated that the pilot was not using ILS throughout his landing approach, because when he struck the flagpole he was 128 feet below the glide path and 650 feet to the left of the center line of the localizer Such a position of the aircraft would have resulted in a full scale deflection of the indicators for both the glide path and the localizer. The captain in command of this flight was considered to be particularly expert in handling the Martin 202, and in the execution of ILS approaches Accordingly, it would be entirely unreasonable to conclude that a pilot of his training would have permitted the aircraft to be flown beyond the recording limits of both the glide path and the localizer if he had been making an ILS approach.

Had the pilot made an ILS approach, malopération of the ILS transmitters could not have caused him to fly so far below the glide path and to the left of the localizer course As explained above, the equipment would have been turned off automatically by the mechanical monitoring devices if the instrument flight path had been transmitted outside of accepted limits, and at the time of the accident the equipment was in full operation

In addition to the above, there is the fact that other pilots were able to complete their landing approaches during the period of the accident by visual reference to the ground, since slant visibility was relatively good

Accordingly, it appears reasonable to conclude that the pilot of Flight 307 attempted to complete his landing approach visually, and did not use the ILS Since the flight struck a flagpole which was clearly marked by red neon obstruction lights, it is also reasonable to conclude that visibility was restricted by blowing snow It is possible that the propeller blasts from the Boeing 377 raised both the height and density of the snow condition Then, the pilot without visual or instrument reference to the runway, and while in an area where heavy turbulence had been reported, flew too low and too far to the left, striking the flagpole

FINDINGS

On the basis of all available evidence the Board finds that

1 The company, aircraft and crew were properly certificated

2. At the time of the accident the aircraft, including all components, and all landing-aid facilities at the Twin Cities Airport were operating in a normal manner

3 Weather conditions were precipitation ceiling, 900 feet, visibility 1/2 mile variable reduced by blowing snow wind from the north at 27 miles an hour with gusts to 40 miles per hour air, cold and dry, and, turbulence over the landing approach flight path

4 During the period preceding and following the accident slant visibility was relatively good, which permitted other flights to complete their landing approaches by visual reference to the runway.

5. Flight 307 was flown 128 feet below the ILS glide path and 650 feet to the left of the localizer at a point 4,180 feet south from the approach end of Runway 35 where the aircraft struck a flagpole well marked by red neon obstruction lights.

PROBABLE CAUSE

The Board determines that the probable cause of this accident was the attempt to complete a landing approach by visual means during which time visual reference to the ground was lost

BY THE CIVIL AERONAUTICS BOARD.

/s/ JOSH LEE
/s/ HAROLD A. JONES
/s// RUSSELL B. ADAMS

D W Rentzel, Chairman, and Oswald Ryan, Vice Chairman, did not take part in the adoption of this report.

Supplemental Data

INVESTIGATION AND HEARING

The Civil Aeronautics Board was notified of this accident at 2130 CST, March 7, 1950, through CAA's Interstate Airways Communications Service An investigation was immediately initiated in accordance with provisions of Section 702 (a)(2) of the Civil Aeronautics Act of 1938, as amended. A public hearing was ordered by the Board and held in Minneapolis, Minn., March 21 and 22, 1950

AIR CARRIER

Northwest Airlines, Inc., is a Minnesota corporation having its principal place of business at 1885 University Avenue, St Paul Minn. The company is engaged in the transportation by air of persons, property and mail under certificates of public convenience and necessity issued by the Civil Aeronautics Board, and it operates in accordance with an air carrier operating certificate issued by the Civil Aeronautics Administration The flight which was made in this case from Washington, D. C , to Minneapolis, Minn , was provided for in the above certificates

FLIGHT PERSONNEL

The pilot in command, Donald B Jones, was employed by Northwest Airlines April 8, 1940 He started flying as a first officer in November of 1941, and was qualified as a captain February 1, 1943. Donald Jones, in addition to serving as a captain for his company, served as a check pilot, giving training in DC-3's, DC-4's and the Martin 202. He had a total of 7,619 flight hours, of which 988 were in the Martin 202 Prior to making this flight he had a rest period of 21 hours and 52 minutes in Washington, D. C He had successfully passed a first class CAA physical examination November 15, 1949, a six months instrument flight check January 11, 1950, and an annual line check flight July 7, 1949 His airline transport pilot rating was current

The copilot of the flight, William Tracy McGinn, was employed by Northwest Airlines July 19, 1943, as a first officer, after which he served in the armed forces from April 6, 1944, until May 23, 1946 After returning to Northwest Airlines he completed captain transition training in December 1949, and received an airline transport pilot rating. His total flight time was 2,432 hours, of which 585 were in Martin 202 equipment He had a rest period in Washington, D. C , of 21 hours and 52 minutes before making this flight William McGinn had successfully passed a first class CAA physical examination February 13, 1950. His airline transport pilot certificate was current

THE AIRCRAFT

Aircraft NC-93050 was a currently certificated Martin 202 All maintenance work sheets and inspection forms were examined from January 1, 1950, until the time of the accident and no item appeared in any of these records which would indicate that the airplane was not in an airworthy condition. All airworthiness directives applicable to the airplane had been complied with The airplane had received a No 1, or 75 hour service check at Washington, D. C , prior to the departure for this flight