CIVIL AERONAUTICS BOARD

ACCIDENT INVESTIGATION REPORT

Adopted: June 14, 1955 **Released:** June 17, 1955

NATIONAL AIRLINES, INC. - PINELLAS COUNTY INTERNATIONAL AIRPORT
ST. PETERSBURG, FLORIDA, JANUARY 10, 1955

The Accident

At 0938,[1/] January 10, 1955, a Lockheed Lodestar, N 33369, owned and operated by National Airlines, Inc., groundlooped following loss of directional control during a takeoff at the Pinellas County International Airport, St. Petersburg, Florida. The aircraft was extensively damaged by the groundloop and fire which followed. The 10 passengers and copilot were not injured; the captain and stewardess received minor injuries.

History of the Flight

National Airlines' Flight 1 of January 10, 1955, originated at Orlando, Florida, destination Miami, Florida, with scheduled intermediate stops at Lakeland, Tampa, St. Petersburg, Sarasota, Ft. Meyers, and West Palm Beach. The flight departed Orlando at 0805 with a crew consisting of Captain Marshall Hope, Copilot George Graham, and Stewardess Sara Reeves.

Lakeland was overflown as there were no passengers debarking or boarding, and after a stop at Tampa the flight landed at St. Petersburg at 0929. The flight was routine to this point and both takeoffs and landings had been made by the captain.

According to company records the gross weight of the aircraft was 18,442 pounds, 1,058 pounds less than the allowable gross weight of 19,500 pounds, and the load was properly distributed with respect to the center of gravity of the aircraft at the time of takeoff from St. Petersburg. The captain taxied the aircraft from the ramp to the run-up position for runway 9, then told the copilot who was seated in the right seat, that he was to fly the next segment of the route.

After a normal run-up the copilot taxied the aircraft to the end of the 5,010-foot runway. The aircraft was then lined up with the runway slightly to the right of the centerline, the tail wheel was locked, and power was applied. As the aircraft progressed down the runway the tail came up and the copilot applied forward pressure to the control column. Shortly thereafter the airplane began to swerve to the left and when this was corrected it went too far to the right. A series of over-corrections followed which resulted in several swerves in both directions. As these maneuvers began the crew noted a five-inch

1/ All times referred to are eastern standard and are based on the 24-hour clock.

drop in the manifold pressure of the left engine. At a speed of approximately 80 knots the aircraft again began turning to the left. The captain immediately took over the controls when he noticed a second drop of 25 inches in manifold pressure of the same engine. Both throttles were closed at once and he tried unsuccessfully to stop the turn. The turn developed into a skid and the main landing gear of the aircraft collapsed, rupturing the right wing fuel tank. The airplane came to rest on the sodded area, off the runway, heading 180 degrees from its original takeoff position. Fire immediately occurred near the right engine nacelle.

Under the supervision of the stewardess all passengers left the aircraft in a rapid, orderly manner through the main cabin door. The pilots left through the cockpit windows. The captain and copilot entered the cabin and made a recheck after all passengers were reported out and away from the aircraft.

Local weather conditions at the time were: Ceiling 30,000 feet scattered, 600 feet scattered, visibility 12 miles, temperature 70, dewpoint 67, wind south 7. Atmospheric conditions were not conducive to carburetor ice.

Investigation

The aircraft came to rest on a westerly heading approximately 1,800 feet from the start of takeoff. The landing gear had failed under side loads during the skid allowing the aircraft to rest on the bottom of the fuselage.

The first identifiable tire mark found on runway 9 was made by the right tire when it was approximately 1,075 feet from the start of the takeoff and 32 feet to the right of the centerline. The distance traveled from the first right tire mark to the stopping point was approximately 750 feet. Braking action was indicated as the marks turned left from the runway heading. The first discernible mark made by the left tire was 50 feet beyond the first tire mark. It was not as wide as the one made by the right tire. The lateral distance between the left and right tire marks was in correct proportion to the normal landing gear width. Marks made by both tires as they continued on the runway decreased in span. There were scuff marks on the runway made by side motion of the locked tail wheel tire.

The captain and copilot stated that soon after the throttles were advanced for both engines to the prescribed 45-1/2 inches of manifold pressure, a drop of 4 to 5 inches was observed on the left manifold pressure gauge. The left throttle was further advanced and this was followed by a second drop in manifold pressure to 20-25 inches. According to the pilots, each drop in manifold pressure was accompanied by a yaw to the left.

The captain testified that he applied full right brake and rudder in an attempt to stop the left turn. This was unsuccessful and he than "stood" on both brake pedals in an effort to stop the aircraft. He also stated that one of his feet was caught momentarily as the aircraft stopped and that he was bruised on the right shin. The copilot testified that he did not use the brakes during the takeoff run.

The flight crew also said that at no time did the aircraft turn to the right after the takeoff start was made from a position lined up on the runway. The stewardess, however, testified that there was a swerve to the right, then to the left, again to the right, followed by a continuous left turn off the runway. One passenger, with aircraft piloting experience, also said that the aircraft "fishtailed" or made definite swerves both right and left prior to the start of the continuous left turn.

Examination revealed that the main landing gear had been torn from the structure and lay in the heavily burned-out area near its normal position. Locking latches indicated that the landing gear was down and locked. The tail wheel assembly, including its mounting, was intact and the locking mechanism operation was normal. The empennage, including rudders, elevator, and their tab controls, was intact except for slight ground contact damage and all units operated normally. Ailerons and trim tabs could be operated with their cables. Wing flaps were found in the retracted position.

The right and left wings were badly damaged by fire inboard from the engine nacelles. The cockpit was in the area of heavy fire damage, and instruments, pedestals, and electrical panels were destroyed. All cables coming out of the yoke were burned off. Rudder torque tubes were found with castings melted away. Except for steel parts the right engine was destroyed by fire. Both propellers were found in the correct low-pitch setting. The main landing wheels were damaged by fire but all wheel bearings were intact. The brake discs showed no evidence of having malfunctioned.

On Lockheed Lodestars the method of changing the fore and aft position of the rudder and brake pedals is by manual adjustment of the hanger arm supporting the pedals. The characteristics of the rudder pedal adjustment mechanism are such that attempts to place the pedal in the farthest forward position can result in the projecting tooth on the adjustment pawl passing beyond the end of the ratchet rather than engaging in the last recess of the ratchet. When this occurs the pedal, on casual inspection, appears to be properly adjusted and the rudder and brake systems are operative. However, in this condition pedal loads are transmitted to the pedal assembly torque tube through mating offsets on the rudder pedal hanger and the torque arm at their attachment to the torque tube. When relatively high pedal loads are applied the aluminum alloy casting at the offset of the pedal arm may tear out causing the loss of rudder and brake control due to the pedal hanger swinging forward. On March 10, 1955, such a condition occurred during the takeoff of a Lodestar at Miami, Florida. In this case the offset of the pedal arm tore out permitting the rudder pedal to swing forward with loss of rudder control. The failure was not apparent to the pilots and was not revealed until the nose cowling of the aircraft was removed and a close examination of the rudder control assembly was made.

With reference to the subject accident, during the investigation Captain Hope, a tall man, stated that his pedals were "forward" at the time of leaving the terminal. Fire destroyed the rudder mechanism and it was therefore impossible to determine the exact position the rudder pedals were in prior to the accident, or if a failure had occurred.

The left engine, which was not damaged during the groundloop or fire, was shipped to Miami for testing under CAB supervision. On a test stand, and later in a similar aircraft both on the ground and in the air, normal operation and power of this engine was obtained. Disassembly of this engine revealed light burning on a portion of the exhaust valve of No. 2 cylinder. The leading edges of the impeller showed light abrasive marks that indicated the passing of a small foreign object through the induction system; no such foreign matter was found. Neither of these irregularities was of any consequence. The fuel pump, carburetor, magnetos, and propeller governor were bench tested for takeoff requirements and found to function normally. The manifold pressure gauges were destroyed in the fire.

Employment records of Captain Hope showed seven years as a National Airlines pilot. His first Lodestar instruction with National Airlines was in 1950 and he was checked out as a reserve captain on Lodestar equipment in August 1954. His time on Lodestars was 410 hours and his total pilot time was over 13,000 hours.

Copilot Graham was employed by National Airlines on December 1, 1954, and after a training period, which included two hours and five takeoffs and landings on Lodestars, was checked out as copilot on scheduled flights. This training complied with the minimum requirements of Civil Air Regulations.2/ At the time of the accident his copilot time on Lodestars was 40 hours, which included approximately five takeoffs and landings. He had accumulated over 3,000 hours of pilot time in the Air Force, mainly on large tricycle-gear type aircraft. His last piloting experience on conventional-gear aircraft, previous to National Airlines employment, was in 1950.

Analysis

It is well known among pilots that the Lodestar aircraft has certain ground characteristics which require the pilot to use extra care to maintain directional control during the early stages of the takeoff run. Considering this fact, together with Copilot Graham's previous flying experience both before and after his employment by the carrier, it is obvious that the captain should have been extremely observant of the copilot's technique. Graham had been accustomed to flying large aircraft with tricycle gear which were not in the least susceptible to these peculiar ground characteristics.

There is no doubt that during the initial stages of the takeoff run the copilot overcontrolled the aircraft in an effort to keep straight on the runway. These oscillations both to the left and right were made until the aircraft went into a severe left turn. The forward speed of the aircraft made it light on its wheels and nearly ready to take off, making braking action less effective. The captain then became alarmed and took over. This action of the captain was either too late or a failure occurred which prevented him from being able to control the aircraft effectively. In this respect it is

2/ Civil Air Regulations Sec. 40.301. Pilot Recent Experience. No air carrier shall schedule a pilot to serve as such in scheduled air transportation unless within the preceding 90 days he has made at least 3 takeoffs and 3 landings in the airplane of the particular type on which he is to serve.

possible that during the captain's efforts to stop the aircraft he exerted sufficient pedal pressure to break the offsets of the torque arm thus preventing braking and rudder action. Since fire destroyed the pedal mechanism this could not be determined.

Although both the captain and copilot stated that the left engine lost power momentarily during the takeoff, inspection and test of the engine failed to duplicate this malfunction. Since this engine was found to function in a normal manner, the drop in manifold pressure was not repetitive.

Findings

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

1. The flight crew, aircraft, and air carrier were currently certificated for the subject flight.

2. According to company records the aircraft was under its allowable gross weight and the load was distributed so that the center of gravity of the aircraft was within approved limits.

3. Directional control was lost in the takeoff run which resulted in a violent groundloop off the runway.

4. There is no evidence indicating that structural failure or malfunction of controls occurred. However, there exists the indeterminable possibility that during takeoff run there was a failure of the pedal assembly.

5. Subsequent engine tests gave no evidence of other than normal operation of the left engine. The right engine operated normally throughout the attempted takeoff.

Probable Cause

The Board determines that the probable cause of this accident was the copilot's loss of directional control during the takeoff run and the inability of the captain to regain control of the aircraft, the latter possibly due to failure of the pedal mechanism.

BY THE CIVIL AERONAUTICS BOARD:

/s/ ROSS RIZLEY

/s/ JOSEPH P. ADAMS

/s/ CHAN GURNEY

/s/ HARMAR D. DENNY

Josh Lee, Member, did not participate in the adoption of this report.

S U P P L E M E N T A L D A T A

Investigation and Hearing

The Civil Aeronautics Board was notified of this accident at 0950 January 10, 1955. An investigation was immediately initiated in accordance with the provisions of Section 702 (a) (2) of the Civil Aeronautics Act of 1938, as amended. A public hearing was ordered by the Board and was held in Tampa, Florida, on February 10 and 11, 1955.

Air Carrier

National Airlines, Inc., is a scheduled air carrier incorporated in the State of Florida, with its principal offices in Miami, Florida. It operates under currently effective certificates of public convenience and necessity issued by the Civil Aeronautics Board and both scheduled and nonscheduled air carrier operating certificates issued by the Civil Aeronautics Administration. These certificates authorize the company to transport by air persons, property, and mail between various points in the United States including Orlando and St. Petersburg, Florida.

Flight Personnel

Captain Marshall Hope, age 46, held a currently effective airline transport certificate with the appropriate rating for the subject aircraft. Captain Hope was employed by National Airlines on February 11, 1948. He had a total of 13,427 pilot hours of which approximately 410 hours were in the type of equipment involved. His last physical examination was on September 14, 1954.

Copilot George Russell Graham, age 26, held a currently effective airline transport certificate with the appropriate rating for the subject aircraft. He was employed by the company on December 1, 1954. He had a total of 3,639 pilot hours of which approximately 43 hours were in the type of equipment involved. The date of his last physical examination was November 12, 1954, and his last flight check was December 17, 1954.

Stewardess Sara Kathryn Reeves was employed by the company on July 15, 1953. Miss Reeves received company training on safety and emergency procedures. Since her employment she had flown approximately 755 hours in Lodestar equipment.

The Aircraft

N 33369, a Lockheed 18-50, serial number 2414, was manufactured on April 14, 1943, and had a total time of 20,627 hours, of which 3,669 hours were since overhaul. It was currently certificated by the Civil Aeronautics Administration. The aircraft was equipped with Wright Aeronautical GR1820-G202A engines and Hamilton Standard model 23E50 propellers. Time since overhaul on the left and right engines was 987 and 723 hours, respectively; on the propellers 951 and 723 hours, respectively.