

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

ACCIDENT INVESTIGATION REPORT

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NATIONAL AIRLINES - BANANA RIVER, FLORIDA, OCTOBER 11, 1945The Accident

National Airlines' Flight 23 of October 10, 1945, en route from New York, N. Y., to Miami, Florida, crashed near Banana River, Florida, at 0234 October 11, 1945, after overshooting the field during an emergency single-engine approach. One of the 16 occupants was seriously injured while the remainder sustained minor injuries. The Lockheed Lodestar was extensively damaged.

Description of the Flight

Flight 23 departed La Guardia Field at 1842 October 10, 1945, for Miami, Florida, with scheduled stops at Raleigh, N. C., and Jacksonville, Florida. Until landing at Jacksonville, the flight had been of a routine nature. However, during the flight the captain paid particular attention to an oil leak from the right engine which could be seen across the top of the engine cowl. Although the leak appeared to be very slight and had not necessitated excessive refill at either New York or Raleigh, Captain S. E. Stoia reported it to the National Airlines maintenance department at Jacksonville, with instructions that the leak be investigated. The aircraft was removed to a repair hangar and returned to the line after approximately one hour delay during which time two new oil hoses had been replaced.

At 0123, October 11, 1945, the flight departed Jacksonville, on an instrument clearance to cruise at 2000 feet to Miami. In order to avoid

a slight turbulence at that flight altitude, Captain Stoia requested change of clearance to 4000 feet. Approval for change of altitude was obtained after a delay due to traffic, and shortly after passing Daytona Beach, the flight climbed to 4000 feet.

At approximately 0210, First Officer W. S. Blomeley, who was seated in the co-pilot position, called Captain Stoia's attention to sparks which were coming from the right engine. Upon inspecting the engine with a flashlight, it was observed that thick smoke was pouring from under the engine cowl and that a wide band of oil was streaming back over the top of the nacelle. Realizing the danger of an oil fire and being anxious to avoid damage to the engine in the event of complete loss of oil, Captain Stoia immediately shut the engine down and feathered the right propeller. He advised the company station at Jacksonville of his difficulty and elected to continue to Melbourne, Florida, about 15 miles away for an emergency landing.

Upon reaching Melbourne, however, the flight was advised by Melbourne Tower that the runway lights were inoperative and that considerable delay would be necessary before the mobile flood light apparatus would be available. Captain Stoia decided, therefore, to proceed to Banana River, 11 miles north, and Banana River Operations was advised by the Melbourne Tower Operator of his intentions and requested to prepare for his arrival. Although the captain had tuned to the Banana River Tower frequency, the tower was not equipped to receive the company frequency and two-way conversation was, therefore, not possible. As the flight approached the Banana River Naval Air Station, the captain observed that runway No. 6 was lighted, and being unable to establish radio contact with the tower, he assumed that it

was the direction of landing intended. However, shortly before the aircraft arrived over the field, the tower personnel changed the runway lights to No. 15 since that runway was the longest one available at Banana River. The aircraft passed over the field at an altitude of 1500 feet, but the traffic pattern established by the flight was too close to the landing area, and, when on the final approach, Captain Stoia realized he was too high for a landing. When over the edge of the field at 300 feet with full flaps and gear extended and the airspeed at 100 mph, the captain decided to go around for another approach. Forty inches of manifold pressure was applied with full low pitch, the gear was fully retracted, and the flaps were retracted to the 30% position.

During the missed approach procedure the captain intentionally held a nose-low attitude in order to accelerate to a normal climb airspeed; however, in spite of the loss of altitude, no increase in airspeed indication was obtained, and the aircraft continued to lose altitude while maintaining a straight course. Approximately 1/2 mile south southeast of the field, the aircraft struck the ground in a fairly level attitude longitudinally. The right wing made the first impact, the aircraft subsequently turning approximately 270 degrees as it skidded to a stop.

Investigation

Examination of the wreckage indicated that the aircraft made impact with the ground in an area of low, flat terrain. Both engines were torn from the nacelles as the diagonal movement of the aircraft across the ground fractured the engine mount tubing. Gasoline from the left engine lines spilled, and a fire broke out on the ground around the left engine nacelle. However, it had been brought under control quickly by use of the CO-2 extinguishers, and no damage was incurred by fire.

Investigation of the No. 1 cylinder exhaust push rod housing revealed an upper hose seal improperly installed and secured. The housing and hose had been installed approximately 1/4 inch too low, preventing the upper end of the housing from being sufficiently sealed by the hose and clamp installation. Due to improper installation and normal engine vibration, the connection was opened in flight allowing oil to leak from the housing as it drained from the rocker box assembly and to blow over the No. 1 and No. 9 cylinders as well as the exhaust collector ring. At least two other hose seals on the subject aircraft were found sufficiently loose to permit moving by hand, which on these clamps, was due to loss of tension of the springs. Detailed inspection of both power plants and the aircraft structure revealed no other indication of malfunction of materiel prior to impact.

Inspection of maintenance records revealed no discrepancies in either overhaul or maintenance. However, investigation disclosed that adequate supervision of lesser skilled employees was not always provided during engine disassembly. In one instance it was observed that an apprentice mechanic was responsible for a disassembly crew in one of National's overhaul shops. The spring clamps employed on the hose seals require a special tool both during installation and disassembly if the clamps are to retain their required tension and are to be reinstalled, yet investigators of the Civil Aeronautics Board observed instances in which pliers were employed in the removal of these clamps during tear-down.

The installation of the new oil hoses and clamps at Jacksonville was accomplished by two certificated mechanics. Step ladders were used on which to work, and hand-flashlights were necessary because of the darkness. A defective spring clamp hose seal was located on No. 1 cylinder exhaust push rod housing which permitted oil leakage during the preceding flights. Two

hoses were replaced, and the spring clamp seal on the upper hose was replaced by a conventional Wittek clamp. No separate inspection was accomplished. The mechanics who participated in the installation checked for oil leakage visually after the engine had been operated on the ground before being returned to the line for the scheduled flight.

The aftercast of the weather conditions existing in the vicinity and at the time of the accident revealed an overrunning of maritime tropical air with broken to overcast altostratus clouds, the bases of which were near 10,000 feet. Except for slight patches of stratocumulus clouds with bases at 2,000 feet in northern Florida, the weather throughout the region was very satisfactory for contact operation. The visibility at Banana River was better than 10 miles and no clouds were encountered in the vicinity. It can therefore be assumed that weather in no sense contributed to the cause of the accident.

Inasmuch as this accident was the third National Airlines accident in rapid succession involving apparent lack of adequate pilot technique, the Civil Aeronautics Administration ordered National Airlines to limit its operation to day contact until all first pilots had been checked by a CAA inspector. Data obtained from the accelerated flight check program subsequent to this accident indicated a definite lack of familiarity among National pilots with characteristics of the Lockheed 18-50 and its single-engine performance. One of the check pilots designated by the company and approved by the CAA, who had previously been acting in the capacity of an instructor and was listed by National Airlines as a Division Chief Pilot, failed on three occasions to pass a standard flight test given by a CAA examiner. This pilot was subsequently removed from the company Airmen's Specifications Forms.

Discussion

During the hearing held at Jacksonville following the accident, discussion was had concerning the adequacy of maintenance facilities and policies of National Airlines. While it was determined that its facilities for maintenance might have been satisfactory, it was apparent that closer attention should have been given by the company to its overhaul organization and its inspectional policies and that greater importance should be attached to engine disassembly. The defect found within the spring-type seal clamp which was removed at Jacksonville could be attributed to a previous disassembly and it is readily apparent that such damage as results in the loss of tension in a spring clamp may be difficult to ascertain during subsequent inspections. Close supervision is constantly required during engine tear-down in order that damage due to the use of improper tools or mishandling of parts be avoided.

Installation of the hose and seal clamp involves a procedure which properly requires the use of both hands and it is difficult to understand why it should have been attempted under conditions which necessitated the use of hand flashlights and step-ladders. Engine maintenance stands were available to the maintenance personnel as were adequate lighting units and it is apparent that sufficient care was not exercised in that these facilities were not used. Furthermore, optimum safe operation dictates the necessity of adequate inspection of such installations. The most effective inspection is provided by a separate inspection agency responsible for approval of such maintenance work before releasing aircraft for scheduled operation.

It is apparent that the change of runways effected by the Banana River Tower personnel proved confusing to Captain Stoia and that it disrupted his plans for approach to the field. However, at the time the

aircraft reached the station, sufficient altitude was still available for the captain to have exercised greater caution in establishing his approach. Once committed to a landing, a go-around would have meant operation at a critical margin regardless of the skill with which it was executed, and it should have been obvious that the time for renewing his approach was while he still had 1500 feet altitude. However, the pilot chose to begin his approach at a moment when he was not completely prepared and as a result, it was necessary to hurry the subsequent landing procedures. It must be concluded, therefore, that the pilot, having had his original plan of approach disrupted, and under the stress of an emergency situation, failed to initiate an alternate approach when ample time was available.

The subsequent errors in technique followed closely and rapidly. Having crowded his approach, it became necessary to use excessive flap for a single-engine landing and Captain Steia unwisely extended full flap. Realizing that he was still overshooting and having then decided to go around, he was further at a disadvantage since he found himself at a low altitude with flap and gear fully extended. At least nine seconds are necessary for gear retraction, and an even greater time may have been necessary because of single-engine operation. During the gear retraction, even if the flap control handle is moved to the "up" position, the retraction of the flaps is retarded. And, significantly, the flaps are retarded in their most disadvantageous position since the drag in the full down position is considerable. It is estimated that an additional 20 to 25 seconds would have been necessary under single-engine operation for the flap to retract to the 30% position. During this period the aircraft could not have been prevented from losing altitude.

Having committed himself to a missed approach procedure, Captain Stoia elected to retain 30% of flap. Under normal conditions, with both engines operating, such a choice might have been a wise one since it would have permitted a more gradual adjustment of attitude to compensate for the loss of lift during flap retraction. However, under single-engine operation, Captain Stoia had no choice but to retract the flap entirely since it is extremely doubtful that a go-around could have been accomplished under the conditions which existed with the drag resulting from the 30% flap. Furthermore, realizing the gravity of the situation, it is difficult to understand why he neglected to use maximum available horsepower when first reaching the decision to go around. More than 100 horsepower was available to him beyond that used during the procedure. It is again apparent, however, that a hurried approach placed him at a serious disadvantage because the procedures which followed required such rapid execution and the subsequent decisions had to be formulated so quickly.

The testimony of the flight crew, the findings of previous Board investigations into the two previous National Airlines accidents, and the results of flight checks accomplished by CAA personnel subsequent to the Banana River accident indicate laxity on the part of the company in its pilot training and flight check program. A lack of acquaintance among pilot personnel with the characteristics of Lodestar aircraft was observed, particularly with respect to marginal operation. The effect of flaps on flight characteristics was not fully known by all National pilots and some specific details were completely lacking in standardization. Such absence of standardization of safe operating procedures can only be attributed to an inadequate training program. However, the company has reported that it has taken action in remedying the situation and in making available sufficient aircraft for a more vigorous program in this respect.

Although corrective action was taken by the Civil Aeronautics Administration following the accident, the evidence showed that a need for such action existed prior to this time. A statement by the Chief, Air Carrier Branch, CAA, to the effect that the company program directed toward maintenance of pilot proficiency had become virtually non-existent indicates the absence of adequate liaison between CAA operational inspectors and the National Airlines. Because of the shortage of qualified personnel during the war, the CAA had not been able to give sufficient attention to the training program of the company or to provide adequate examination of those pilots designated by the company as check-pilots.

Findings:

Upon the basis of all available evidence, the Board finds that:

1. The pilots, aircraft and company were properly certificated.
2. The operation involving flight from Jacksonville to Miami, was in accordance with company operating specifications and the applicable Civil Air Regulations.
3. Faulty installation of a right engine push rod housing upper hose and seal clamp resulted in separation from the push rod housing and leakage of oil in flight.
4. In order to avoid a possible fire and damage to the engine, the pilot feathered the right engine, declared an emergency and prepared for a single-engine landing at the nearest available field.
5. While the aircraft was a short distance from the Banana River Naval Air Station, the tower personnel changed the direction of landing 90 degrees without previous notification to the flight.
6. An approach to the field was established too close for a safe landing.
7. Excessive flaps were used for an emergency single-engine approach.
8. A missed approach procedure was initiated in which 30% flap

remained extended during the attempted go-around.

9. Maximum available horsepower was not utilized.

10. The aircraft was not able to maintain altitude during the pull-out and struck the ground approximately a half-mile beyond the field.

11. An adequate training program had not been maintained by the company for pilot personnel.

12. The Civil Aeronautics Administration had not maintained adequate liaison with National Airlines concerning either the company's pilot training and flight check programs, or the personnel and facilities essential thereto.

Probable Cause:

On the basis of the foregoing the Board determines that the probable cause of this accident was an excessively hurried approach for an emergency single-engine landing and the faulty execution of a missed approach procedure. The cause of engine malfunction was faulty installation of an oil hose and connecting clamp. A contributing factor to the accident was the failure of the company to maintain an adequate training program for pilot personnel and to provide the facilities required for such a program.

BY THE CIVIL AERONAUTICS BOARD:

/s/ James M. Landis

/s/ Harllee Branch

/s/ Josh Lee

/s/ Clarence M. Young

Ryan, Vice-Chairman, did not take part in the decision.

SUPPLEMENTAL DATA

Investigation and Hearing

The Atlanta office of the Civil Aeronautics Board received notification of the accident at 0315, October 11, 1945, and the Board immediately initiated an investigation in accordance with Section 702 (a) (2) of the Civil Aeronautics Act of 1938, as amended. Air Safety Investigators from the Board's Atlanta office arrived at the scene of the accident at 0745, and were joined by other personnel of the Safety Bureau who assisted in the investigation.

The Board ordered a public hearing which was held in Jacksonville, Florida, October 22, 23, and 24, 1945. The Chief, Investigation Division, Safety Bureau presided, and other personnel of the Safety Bureau staff participated.

Air Carrier

National Airlines, Inc., a Florida corporation with headquarters in Jacksonville, 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 company to carry persons, property and mail between various points in the United States, including New York, N. Y., and Miami, Florida.

Flight Personnel

Captain Samuel E. Stoa, age 31, had been employed by the company since June 20, 1942, and had accumulated a total of 3,059 hours, of which 2,632 hours were in Lockheed 18-50 equipment. First Officer William S. Blomeley, Jr., age 24, had been employed by the company since March 29, 1945, and had accumulated a total of 1219 hours, of which 363 hours were as copilot in Lockheed 18-50 equipment. Mary Genevieve Purdy was Stewardess.

Both pilots were properly certificated for the flight involved, and the captain was qualified for the route.

Aircraft

The Lockheed Lodestar, 18-50, NC 15555 was properly certificated. It had flown a total of 11,396 hours, with about 1267 hours since the last major overhaul. It was equipped with two Wright R 1820 G-202A Cyclone engines with 11,520 and 1,908 hours, respectively, for the left and right engines and 447 and 298 hours, respectively, since the last overhaul. Hamilton Standard 23-E-50 hydromatic propellers were installed. On departure from Raleigh, N. C., the total weight was within approved limits, and the load was properly distributed with respect to the center of gravity.