File No. 2-0038

CIVIL AERONAUTICS BOARD

AIRCRAFT ACCIDENT REPORT

OPTED: April 13, 1959 **RELEASED:** April 17, 1959

LOCKHEED LODESTAR, N 300E,

NEAR GRANTS, NEW MEXICO, MARCH 22, 1958

SYNOPSIS

A Lockheed executive aircraft, en route from Burbank, California, to Tulsa, Oklahoma, crashed and burned 12 miles southwest of Grants, New Mexico, during darkness, the morning of March 22, 1958. All four occupants were killed.

The flight had made routine position reports from its assigned altitude of 11,000 feet until passing over Winslow, Arizona. Shortly after the last routine report at 11,000 feet a higher altitude was requested of Air Traffic Control because of encountering icing conditions. The request was granted and the aircraft reported, five minutes later, being at 13,000 feet between cloud layers. The last report was over Zuni, New Mexico, estimating Grants at 0249, 19 minutes later. Ten minutes after this report a ground explosion at an elevation of 7,200 feet m. s. l. was observed by another flight and by ground witnesses. The wreckage of N 300E was found in the area of the witnessed explosion.

The right engine master rod bearing had failed in flight and the right propeller was feathered; however, complete loss of control followed and the aircraft struck the ground in a very steep angle of descent. As far as can be determined, there was no failure of the aircraft structure or controls prior to ground impact. The aircraft had anti-icing equipment installed and the pilots were experienced in Lodestar operation. There is evidence of the aircraft being considerably over its maximum allowable weight at departure and it is believed that the comparatively sudden failure of an engine at 13,000 feet created a situation, made more critical by virtue of the then existing weight, in which the pilot was unable to maintain control of the aircraft.

Investigation

U. S. Weather Bureau forecasters at Burbank cannot recall briefing a flight to Tulsa the evening of March 21. However, a briefing is not mandatory and the pilots of N 300E may have made their own analysis from the weather maps and charts which are displayed in the Weather Bureau office. At the time of departure a steady rain was falling and the freezing level, at Burbank, was 8,000 feet. On the planned route of N 300E moderate-to-severe turbulence was forecast at 5,000 feet and above.

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An instrument flight plan was filed with ARTC (Air Route Traffic Control) specifying flight at 11,000 feet, direct Burbank to Palmdale, California, airway Victor 12 Amarillo, Texas, airway Victor 140 to Tulsa, Oklahoma.

The flight departed with two pilots and two passengers aboard, at 2241 P. s. t., and position reports were made on schedule.

The flight progressed normally until 0157[1/] when a report was made over Winslow, Arizona, at 11,000 feet, estimating Zuni, New Mexico, at 0226. At 0214 the flight gave Zuni radio this message: "N 300E, estimating Zuni at 28. At one one thousand encountering light-to-moderate icing of all types. Request one three thousand, believe I will be on top at one three thousand." A clearance to 13,000 feet was issued by Albuquerque ARTC and delivered to the flight at 0215. At 0223 the flight reported: "N 300E reached one three thousand at two zero, now between layers." At 0231 the flight reported: "N 300E over Zuni at three zero, one three thousand, estimating Grants at four nine." This was the last known message from the aircraft.

An airline captain, whose flight was in the vicinity at the time, heard the pilot of N 300E accept the clearance to 13,000 feet. The captain stated there was no indication of apprehension or stress in the pilot's voice.

The scene of the accident was in a small valley between two mountains at an elevation of approximately 7,200 feet, 12 miles southwest of Grants, New Mexico. The major portion of the wreckage was in or adjacent to the initial impact crater. The crater was approximately 25 feet long (measured north to south), 12-1/2 feet wide (measured east to west), and 3-1/2 feet deep.

The fuselage, center section, and empennage were completely destroyed by the severe impact and subsequent fire. The left and right wing panels outboard of their respective nacelles were found next to the impact crater in normal position relative to the remainder of the structure. Both wings were crushed chordwise. Wing flaps, still attached, were in the retracted position. The landing gear was also found in the retracted position.

Examination of the rudders, vertical fins, elevators, trim tabs, and horizontal stabilizers indicated that the empennage had been intact prior to ground impact. No evidence of malfunction of the empennage or control therein was found. The control system forward of the empennage was so severely damaged by impact and fire that its condition prior to impact could not be determined. However, flight control cables were found to be properly attached to their respective terminals.

Examination of the two powerplants disclosed that the right propeller was in the feathered position at the time of impact. Disassembly of the right engine revealed a failed master rod bearing and several broken connecting rods. Examination of the left engine indicated normal operation prior to impact. A review of the last two 100-hour inspections (Atlantic Aviation, Teterboro, New Jersey, January 8, 1958, and Mattituck Air Base, Linden, New Jersey, March 7, 1958) revealed no items inspected or corrected that have any connection with the master rod bearing failure in the right engine. The aircraft logs carried

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1/ All times herein are mountain standard, unless otherwise indicated, and are based on the 24-hour clock; all altitudes are mean sea level.

in N 300E were destroyed in the fire occurring after ground impact, except for a few burned pages.

There are two vacuum pumps on the Lockheed Lodestar (one on each engine) to operate the flight instruments (artificial horizon, directional gyro, and turn and bank). A right or left selector for these pumps is located on the lower right side of the instrument panel. In case of an engine failure the selector must be positioned to the operating engine. It was not possible, because of impact and fire damage, to determine the position of the selector at the time of the crash. This fact also applies to the fuel selector positions.

The maximum certificated takeoff weight for Lockheed N 300E as revealed by the aircraft's documents and other sources was 18,605 pounds. The aircraft was fueled to capacity (798 gallons) the evening of March 21 at Lockheed Terminal. This amount of fuel was possible because of the use of two 77-gallon belly tanks in addition to the standard tank installation. It is not known if a weight and balance computation was made by the crew prior to departure.

The following weights are valid as all items listed are known to have been aboard. Miscellaneous items such as fresh water supply, buffet equipment, canned food, are not included as the actual quantities and weights are not known. Minimum takeoff weight for this flight is computed as follows:

Aircraft, empty weight (per ACA-337)[2/]	14,566
De-icer boots	105
Fuel, 798 gal. @ 6 lb./gal.	4,788
Oil, 36 gal. @ 7.4 lb./gal.	266
Alcohol (anti-ice) 14.6 gal. @ 6.75 lb./gal.	98
Inverter for tape recorder	22
Spare tail wheel	20
Typewriter	12
Two pilots @ 170 lbs.	340
Pilot Navigator kit and baggage @ 40 lb.	120
Two passengers @ 170 lb.	340
Passenger baggage @ 40 lb.	80
Total	20,757

Accordingly, N 300E was at least 2,152 pounds over the maximum certificated weight at the time of takeoff. Assuming a fuel burnoff, including climb, of 320 gallons, three hours after takeoff the weight at the time of the crash was approximately 18,837 pounds, or 232 pounds over maximum certificated weight.

The standard fuel capacity of Lockheed Lodestar, model 18-56, is 644 gallons divided among four tanks. In January 1958 two additional tanks (77 gallons each) in the No. 4 baggage compartment were approved as a permanent installation by the CAA District Office, Teterboro, New Jersey. Forms ACA-337, on file with the same CAA office, show the empty aircraft weight to be 14,566 pounds. This weight plus a fuel load of 798 gallons produces a weight of 19,354 pounds, or 749 pounds over the maximum allowable without pilots, passengers, baggage, or even the other incidental aircraft or engine supplies. The

2/ ACA-337 is a Civil Aeronautics form required when there is major repair and alteration (airframe, powerplant, propeller, or appliance) It is executed by the repair station and approved by a CAA agent.

Board received testimony concerning several transcontinental trips where the full fuel capacity was utilized. The overload of 2,152 pounds that existed at the time of the takeoff from Burbank on March 21, 1958, was not an isolated overload incident.

Flight test data (Spec. No. A-723) compiled by the Civil Aeronautics Administration indicates the single-engine ceiling of the Lockheed, model 18-56, to be 13,350 feet at a weight of 18,500 pounds.

A multicentered low pressure area extended from the Plains States westward to the Pacific coast. One low pressure center was drifting slowly eastward through the Texas panhandle. A weak occluded front extended southwestward through western Texas and northern Mexico to a shallow wave near San Diego, California.

Upper air charts (700 and 500 millibar levels) showed pronounced low pressure centers over southern New England and off the Pacific coast with no pronounced ridges or troughs in the Southwestern States.

On the night of March 21 along the route between Prescott, Arizona, and Grants, New Mexico, (a) the freezing level was approximately 10,000 feet, (b) winds at the 10,000- to 15,000-foot level were generally from 230 to 270 degrees at 30 to 40 knots, (c) ceilings after midnight and prior to 0300 were mostly 3,000 to 5,000 feet lowering occasionally to 1,500 feet to 2,500 feet in light rain, (d) surface visibilities were 10 miles or better, (e) Grants, New Mexico, at the time of the accident was reporting clear skies and visibility 30 miles with a cloud bank to the west, (f) Zuni, New Mexico, at this same time reported a broken ceiling measured at 1,500 feet with an overcast above, based at 2,500 feet and a visibility of 10 miles in very light rain, (g) radiosonde observations indicated a possible top to the lower cloud decks at 12,000 feet. Visibilities were greater east of Grants. The pilot of an Air Force B-36, at 20,000 feet, 30 miles south of Albuquerque, reported seeing an explosion at 0240 on the surface between Zuni and Grants.

An employee of the CAA at the Grants communications station reported to Albuquerque ARTC Center that at 0240 he had observed what appeared to be a surface explosion southwest of the Grants station. This agrees with the observation of the Air Force witness and the actual location of the wreckage of N 300E.

Lockheed Lodestar N 300E, owned and operated by Ayer Lease Plan, Inc., of Linden, New Jersey, had been leased to the Michael Todd Company, Inc., of New York, New York, in October 1957. Pilot William Verner had been assigned to the aircraft since that time and had made numerous trips, including two cross-Atlantic flights and a tour of Europe. Both Mr. Verner and Mr. Barclay, the copilot, held airline transport ratings and were qualified and experienced on Lockheed Lodestar aircraft. The purpose of the flight which was terminated by the accident, was to transport Mr. Todd and his associate, Mr. Arthur Cohn from Burbank, California, to New York City via Tulsa, Oklahoma.

The Board was notified of a Lockheed Lodestar, operated by a major oil company, encountering icing conditions on February 28, 1958, during a flight from Denver, Colorado, to Chicago, Illinois. This aircraft experienced an unusual ice accretion on both pitot masts, located on the forward underside of

the fuselage, that produced a serious underreading and fluctuation on both the pilot's and copilot's air speed indicators, leading the pilot to believe he was at or near a stalled condition, when in reality the aircraft was flying well above the stall speed. In this incident the pilot was able to maintain control and descend to clear conditions through the exclusive use of the vacuum operated flight instruments. This aircraft did not have an alternate source for the static system by reason of modification.

With regard to N 300E the manufacturer has advised the Board that all aircraft of the type (USAF C-60, U. S. Navy R-50-5, civil type 18-56) were originally equipped with an alternate source for the static system. A careful examination of all the Forms ACA-337 on file with the Civil Aeronautics Administration failed to reveal an elimination of the alternate source. The forms do indicate the installation of dual pitot masts on the underside of the fuselage below the cockpit. This installation is the same as that on the aircraft encountering icing affecting the pitot static system. N 300E was delivered to the U. S. Navy as a model 50-5 Lockheed.

Analysis

On that portion of the route through central Arizona and western New Mexico, all evidence indicates that the flight would have encountered extensive cloudiness, numerous shower areas, and moderate icing in clouds, and precipitation above 10,000 feet.

Fifteen minutes before reaching Zuni, New Mexico, the flight had added two minutes to its Zuni estimate, advised that it was encountering moderate icing at 11,000 feet and requested clearance to 13,000. Clearance was granted and the flight subsequently reported (0223) at 13,000 feet between layers.

It was raining at Zuni, New Mexico, when the flight passed overhead at 0230 and Grants, New Mexico, was reporting a cloud bank to the west. These weather observations, combined with testimony of ground and air witnesses describing the ground explosion associated with the accident, indicate that the accident site was located at the eastern edge of the bad weather area.

On the basis of the foregoing, it is apparent that icing conditions had been encountered by the flight, necessitating a change of altitude. A climb of 2,000 feet carried the aircraft between cloud layers and the use of boot-type de-icing equipment partially alleviated the icing difficulty. In view of continued passage through below freezing temperatures, residual ice not discharged by the boots was retained on the aircraft. Furthermore, passage through a precipitation area over Zuni immediately prior to the crash may have added some additional ice.

Such icing would have had an adverse effect upon the single-engine performance capability of this heavily loaded airplane which was near its usable ceiling.

When operating on single-engine at or near the single-engine ceiling, at maximum weight, a stall and loss of control can easily occur. This requires increased vigilance on the part of the pilot to maintain the proper aircraft attitude and airspeed. Had the aircraft departed Burbank at its permissible weight of 18,605 pounds the weight, because of fuel consumed, would have been

approximately 16,500 pounds, or about 2,000 pounds less than its actual weight at the time of the accident. Consequently, stalling speed of the aircraft would have been lower at the time of the emergency.

It appears that this accident was in the pattern of other accidents investigated by the Board where an aircraft overload was either the primary cause or a major contributing factor in the accident.

It is pertinent to point out that N 300E, when fueled to the capacity of its four standard tanks and with a normal oil supply, would have exceeded its certificated allowable weight by 91 pounds without a flight crew or payload. The full use of the two additional 77-gallon baggage compartment tanks under the above conditions would add 924 pounds of fuel weight to the already existing overload. Although this aircraft had been operated in the past at weights in excess of the maximum certificated weight pursuant to a flight permit issued by the Administrator, no waiver of the certification weight limits was issued for the flight of March 22 and 23, 1958, a flight on which passengers were carried.

Conclusions

The Civil Air Regulations prohibit the operation of a civil aircraft at a gross operating weight in excess of the maximum authorized by the certificating authority. This aircraft (N 300E) was overloaded when the engine failure occurred en route which was followed by a stall and loss of control at the 13,000-foot altitude. There is no doubt that control was lost as evidenced by impact markings on the ground.

The pilot of a civil aircraft is charged with having knowledge of the provisions of the Civil Air Regulations and has the responsibility of determining that his aircraft when loaded does not exceed the gross weight and center of gravity limits prescribed for it. As previously stated, both of the pilots possessed airline transport ratings and were well qualified in Lodestar aircraft. In this instance, the pilot ordered and supervised the full fueling of the aircraft; it is inconceivable that he was not aware of the overloaded condition.

This entire matter has been brought to the attention of the Administrator of the Federal Aviation Agency by the Board with a recommendation that consideration be given to the development of adequate safeguards to prevent overloading under circumstances such as those involved in this accident.

Ice accretion on the aircraft surfaces undoubtedly increased the weight of the already overloaded aircraft and adversely affected its flight characteristics. With icing conditions in existence and the wing de-icing boots in operation at the time of the engine failure, control of the aircraft would have been rendered even more critical.

The Board also believes that the sudden engine failure and the necessary immediate initiation of single-engine procedures distracted the pilot's attention from the flight instruments sufficiently to result in loss of control of the aircraft and the 5,800-foot terrain clearance was insufficient to permit recovery by instrument reference.

Probable Cause

The Board determines that the probable cause of this accident was the loss of control of an overloaded aircraft following the failure of an engine at a cruising altitude which was critical for single-engine operation. The loss of control was aggravated by surface ice accretion.

BY THE CIVIL AERONAUTICS BOARD:

/s/ JAMES R. DURFEE

/s/ CHAN GURNEY

/s/ HARMAR D. DENNY

/s/ G. JOSEPH MINETTI

/s/ LOUIS J. HECTOR

SUPPLEMENTAL DATA

Investigation and Taking of Depositions

The Civil Aeronautics Board was notified of the accident the morning of March 22, 1958. An investigation was immediately initiated in accordance with the provisions of Section 702 (a) (2) of the Civil Aeronautics Act of 1938, as amended. Depositions were taken at Linden, New Jersey, on July 10, 1958, and at Santa Monica and Burbank, California, on July 30 and 31, 1958.

Aircraft Owner

Lockheed Lodestar, N 300E, was owned by Ayer Lease Plan, Inc., Linden Airport, New Jersey. The aircraft had been on lease to movie producer Michael Todd since October 1957. Ayer Lease Plan, Inc., are lessors of executive type aircraft and own many types of aircraft. Pilot personnel in this instance for the operation of the leased aircraft was provided by the Linden Flight Service, Inc., Linden Airport, New Jersey.

Flight Personnel

William Stebbins Verner, 42 years old, held a currently effective airman certificate with ratings of airline transport and flight instructor. He had been employed by Linden Flight Service, Inc., since April 22, 1957. His total pilot time was 7,680 hours, of which 386 were in Lockheed Lodestars. His last physical examination was passed, no waivers, on January 14, 1958.

Thomas Barclay, age 36, was employed by Linden Flight Service, Inc., in December 1957. He held a currently effective airman certificate with ratings of airline transport and flight instructor, and airplane and engine mechanic. Company records indicate a total pilot time of 4,500 hours, of which 3,500 were in multi-engine equipment. His last physical examination was passed on May 9, 1957, with no waivers. Mr. Barclay was assigned as copilot and mechanic on N 300E.

The Aircraft

Lockheed Lodestar, model 18-56, serial number 2312, was owned and operated by Ayer Lease Plan, Inc., Linden Airport, Linden, New Jersey. Total time on the aircraft was 3,910 hours with 54-1/2 hours since the last 100-hour inspection on March 7, 1958. The aircraft was equipped with two Wright model 1820-56A engines and the propellers were Hamilton Standard, model 23E50, with 6339A-12 blades. Total time on the No. 1 and No. 2 engines was 703 hours and 449 hours, respectively. N 300E had not been modified to permit the use of takeoff power in excess of 1,200 h. p. per engine.