File No 1-0072

CIVIL AERONAUTICS BOARD

AIRCRAFT ACCIDENT REPORT

ADOPTED: May 8, 1961 **RELEASED.** May 12, 1961

TRANS WORLD AIRLINES, INC., LOCKHEED CONSTELLATION L-1049H, N 102R,
MIDWAY AIRPORT, CHICAGO, ILLINOIS, NOVEMBER 24, 1959

SYNOPSIS

On November 24, 1959, at approximately 0535 c. s. t., a Lockheed Constellation, N 102R, Flight 595, operated by Trans World Airlines, Inc., crashed into a residential area about one-fourth of a mile southeast of Midway Airport, Chicago, Illinois, killing all persons aboard, demolishing the aircraft, and fatally injuring eight persons on the ground.

Flight 595, loaded with cargo, took off on runway 31L of Midway at approximately 0531 c s t., November 24, 1959, bound for Los Angeles, California. As the aircraft began a left turn, the crew notified Midway Tower they had received a fire warning on the No 2 engine and had shut it down. They also informed the tower the flight would return and land. The aircraft proceeded in a continuing left turn around the airport in an elliptical pattern and below the clouds which were based at an altitude of 500 to 600 feet.

In the turn to final approach to runway 31 the aircraft banked in excess of 45 degrees during which it developed an excessive rate of sink. When the aircraft reached the tops of the trees its wings were nearly level and its nose was raised in a climbing attitude; however, the descent continued The wing flaps were being retracted during the last 5 to 10 seconds of the final descent and were found to be symmetrically extended at 24 percent upon impact.

It is the conclusion of the Board that this accident was the consequence of maneuvering the aircraft during the turn to final approach in such a manner as to cause a rate of sink from which recovery was not possible.

Investigation

Trans World Airlines Flight 595 of November 24, 1959, was a scheduled cargo flight from Midway Airport, Chicago, Illinois, to Los Angeles, California, and the aircraft assigned was a Constellation, model L-1049H, serial number 1252, N 102R. The crew consisted of Captain Claude Wilbert Helwig, First Officer Delmas Earl Watters, and Flight Engineer Aerion Lyman Auge, Jr.

Flight 595 was scheduled to depart Midway Airport at 0310[1/] November 24, 1959; however, departure was delayed by the inability of the ground crew to complete loading of the aircraft because of a breakdown in loading equipment. As a result

1/ All times herein are central standard based on the 24-hour clock.

it did not depart until about 0530. Evidence indicated that at departure the aircraft was properly loaded to a gross weight of 126,606 pounds The allowable gross weight for takeoff computed for this flight was 127,400 pounds, and the allowable landing weight was about 115,000 pounds

The aircraft had been flown from New York City to Midway where it landed at 0216 November 24. The flight was reported by the incoming crew as routine. The incoming engineer did, however, make a log entry specifying that the ignition analyzer indicated that a spark plug on each of engines Nos 1, 2, and 4 had developed the initial stage of secondary high resistance. All maintenance persons contacted, including the incoming engineer, stated the condition did not require a change of the affected plugs, and in their opinion the aircraft was completely airworthy for the flight to Los Angeles.

The crew assigned to Flight 595 was off duty from November 20, 1959, until the morning of November 24 Rather than spend their layover in Chicago each of the three crew members returned to his home in California via TWA in a passenger capacity Captain Helwig returned to Midway at 1645, November 23, and checked into the crew lounge at TWA's operations at 2140 and then retired. First Officer Watters arrived at Midway at 0720, November 23, and checked into a hotel Flight Engineer Auge returned to Chicago's O'Hare Airport at 2115 on November 23 and checked into the crew lounge at Midway at 2345. At 0050 on the morning of the 24th First Officer Watters was alerted for the flight, and then at 0200 that same morning Captain Helwig and Flight Engineer Auge were alerted

The flight was dispatched in accordance with TWA's procedures and the crew filed an IFR flight plan to Los Angeles. The aircraft was inspected by the crew and about 0520 it was taxied to runway 31L for takeoff. The flight was then about 2 hours and 20 minutes behind schedule. The flight received its ATC clearance to the Los Angeles Airport and its takeoff time was logged by Midway Tower as 0531.

The conversation between Flight 595 and Midway Tower was tape recorded. The flight started its takeoff roll upon or immediately after acknowledging Midway Tower's takeoff clearance. The timing of the events that follow started the instant Flight 595 acknowledged its tower clearance to commence the takeoff roll.

The takeoff appeared normal to the tower operators After 1 minute and 13 seconds the crew transmitted they were starting a left turn. Seven seconds later the crew informed the tower of the fire bell on the No 2 engine, that the engine had been shut down and the flight was coming back in. During the next 25 seconds Midway Tower gave landing clearance to the flight for runway 31 or any runway it desired to use. The crew told the tower they would use runway 31 Eleven seconds later the flight rejected an offer from the tower to call out the emergency equipment

Midway Tower asked Flight 595 if it desired a Kedzie localizer approach[2/] or if the crew wanted to make it VFR To this question they answered, "I think we'll make it VFR OK " Forty-five seconds had elapsed since their last transmission.

2/ Kedzie is a low frequency compass locator radio beacon at the outer marker of the ILS approach to runway 31L at Midway, 3.3 nautical miles on an extended centerline from the approach end of runway 31L. To fly this approach an aircraft should be on the heading of that runway at 1,500 feet m.s.l. (about 900 feet above the ground) and prepared to start a descent to that runway as it passes over the beacon.

Six seconds later, Flight 595 acknowledged its clearance to land on runway 31L with an "OK." Total elapsed time since takeoff was then 2 minutes and 47 seconds. Forty-three seconds later the tower operator transmitted, "NO .... NO!!" which he explained was a spontaneous exclamation upon seeing Flight 595 crash into the houses and burst into flames. A total time of 3 minutes and 30 seconds had then elapsed. The exact time of the crash was fixed at 0535 as that was the time the Commonwealth Edison Company of Chicago recorded the power failure resulting when Flight 595 hit their powerlines.

Ten minutes prior to the crash the United States Weather Bureau reported the Midway weather as follows Partial obscuration, scattered clouds at 600 feet, measured 900 foot overcast; visibility 3 miles; light rain, fog, and smoke; wind west 10 knots, temperature 39; dewpoint 38', and altimeter setting 29.33; Remarks: 2/10 of sky obscured by fog. The crew of an aircraft which took off about three minutes prior to 595's takeoff reported to Midway Tower about one minute before the accident that there were scud clouds west of the airport at 500 feet. Twenty minutes after the accident the overcast was reported at 600 feet and the visibility still 3 miles This latter observation was a routine Weather Bureau observation at 0555. The Weather Bureau did not make a special accident observation because they were not notified of the accident until 0605.

According to witnesses there was no ice being formed on any of the buildings or aircraft on the ground from the light rain that was falling at tne time of the accident

The total distance Flight 595 traveled over the ground from the beginning of its takeoff roll to the point of impact was about eight statute miles. This flightpath was elliptical in shape and at no time was the aircraft more than two miles from the airport.* Ground observers all stated that their view of the aircraft was never obstructed by clouds.

According to witnesses, including tower personnel, the aircraft banked in excess of 45 degrees during the left turn to the final approach heading. It lost altitude as the turn progressed and when it reached an altitude described as just above the tops of the trees the wings were almost level and the nose was raised slightly to a climbing attitude; however, the rate of descent continued until the aircraft struck the trees and buildings. Statements of witnesses along the flightpath and within one mile of the impact area indicated that the engines sounded as if they were laboring to keep the aircraft airborne.

Investigation of the wreckage indicated that the left main and nose gear assemblies were up but unlocked and the right main gear was up and locked. The wing flaps were extended symmetrically about 13 inches or 24 percent of their full travel, and the wing flap control valve and follow-up mechanism were positioned for flap movement toward the "up" position. The wing flap control lever was about one-eighth of an inch aft of the full forward position and bent over 80 degrees toward the captain's seat. It was jammed in that position as a result of the impact and appeared to have been in that position prior to impact as there was no indication of the lever having been forcibly moved to or from the jammed position. The wing flap control lever is located on the top, right side of the center control stand. There are four placarded positions on the quadrant· "Takeoff" (60 percent extension), "Approach" (66 percent extension), "80 percent"

* See diagram of Probable Flight Path, Attachment 1.

(80 percent extension), and "Landing" (100 percent extension) There are lever-position detents at the above-mentioned settings except the "Approach" position. There is also a detent at the full forward (fully retracted) position The wing flap control lever will remain in any selected position until moved whether in the detent or not The wing flap control unit allows pre-positioning of the flaps and changing direction of the flap movement at any time without completing the selected cycle. Retraction time for the wing flaps from a setting of 60 percent to fully retracted is about 15 seconds provided the landing gear is not retracted at the same time

Examination further revealed the No 2 engine had been shut down and its propeller feathered. There was no evidence of any inflight fire, however, the fire extinguisher had been activated in the No 2 engine. The ground fire and impact damage precluded any testing of the fire warning system serving the No 2 engine. Engines Nos 1, 3, and 4 appeared to be in good condition aside from impact damage There was no evidence of structural failure prior to impact or any indication that the cargo may have shifted Upon impact, a jet engine weighing 5,880 pounds was torn directly from its tie-down position in the cargo compartment and thrown clear of the wreckage

On January 23, 1960, a test flight in the same type aircraft was conducted by the Lockheed Aircraft Corporation at Los Angeles, California. Conditions surrounding the fatal flight were simulated as nearly as possible. Definite stall warnings were apparent to the pilot in all of the test runs and recoveries from the stall buffet zone could be made with a loss of no more than 200 feet of altitude. On one of the runs the aircraft was banked up to 42 degrees and the airspeed allowed to drop to 108 knots indicated A fairly rapid rate of sink developed and the aircraft was not yet in the stall buffet zone Not enough power was available to keep the aircraft in level flight and a loss of several hundred feet was necessary to acquire enough airspeed to recover from this sinking condition. The pilot described the aircraft as being on the backside of the power curve

On this flight the wing flaps were retracted from 60 percent to 0 percent and from 80 percent to 0 percent. Simultaneously with these flap retractions the landing gear was retracted from the "down and locked" to the "up and locked" position The retraction times respectively were as follows Flaps· 21 seconds; gear 19 seconds, flaps 24 seconds; gear 15 seconds.

Analysis and Conclusions

The flight had progressed from New York to Chicago in a normal manner Ground handling of the aircraft at Midway Airport was properly conducted but difficulty with equipment caused a delay in loading of the aircraft cargo compartment which, in turn, caused the flight to be behind schedule. All documents and records pertaining to the status of the aircraft were in order and indicated the aircraft was airworthy and properly loaded.

The crew's training and proficiency records indicate the crew members were properly qualified for the flight as planned. The company provided ample opportunity for them to obtain sufficient rest prior to their flight; however it appears questionable that the captain and flight engineer took full advantage of this opportunity

The aircraft was operating in a satisfactory manner until the fire warning shortly after takeoff. The captain had successfully coped with the emergency, and engines Nos. 1, 3, and 4 were in good operating condition and capable of sustaining the aircraft in properly conducted flight.

The control tower operators offered their assistance to the flight by giving them clearance to land on any of the runways and offering to have the emergency equipment and crew stand by. The flight's rejection of the offer to alert the emergency crews indicates they were not extremely concerned for their safety and had the situation pretty well in hand. It further suggests that the crew was certain there was no actual fire in the No. 2 engine.

For the flight to have made a Kedzie localizer approach would have necessitated their climbing to an altitude which would have put them in the overcast and consumed considerably more time. Their decision to stay VFR below the clouds was reasonable; however, this did make it necessary for them to fly at an altitude between 400 and 600 feet above the ground.

Analysis of weather conditions existing at the time of the accident showed that Flight 595 should not have encountered structural icing or significant turbulence during its short flight.

In anticipation of landing, a gear-down, flap-extended configuration was established on the downwind portion of the traffic pattern. The wing flaps were at least in the takeoff position of 60 percent and had been allowed, presumably, to remain so extended since takeoff, because less than one minute had elapsed from start of takeoff roll until the fire warning, and at that time the captain planned to return to land. The track over the ground on the "downwind" curved toward the runway. When the aircraft was positioned to start the turn to final approach a sharp turn was needed to avoid overshooting the extended centerline of runway 31L.

The Board believes the captain attempted such a turn, and in doing so combined a very steep bank with high gross weight and three-engine aircraft configuration in such a manner that the aircraft entered a regime of flight describable as being on the backside of the power curve. More power and altitude than was available to him was needed to safely recover the aircraft. At some point in this turn the captain very probably decided to discontinue the landing approach and attempted a "go-around." Hence, he called for gear up at or near this same point, but for an unexplained reason the wing flap controls were positioned for flap retraction.

The Board believes an accident such as this is a certainty when at low altitude an excessive rate of sink is coupled with the additional loss of lift caused by the simultaneous retraction of the wing flaps from 60 to 24 percent. The flap setting of 24 percent was their intransit position as the aircraft struck the ground

Probable Cause

The Board determines the probable cause of this accident to be the maneuvering of the aircraft in a manner that caused it to develop an excessive rate of sink while in the turn to final approach.

BY THE CIVIL AERONAUTICS BOARD

/s/ ALAN S BOYD
Chairman

/s/ ROBERT T. MURPHY
Vice Chairman

/s/ G. JOSEPH MINETTI
Member

/s/ WHITNEY GILLILLAND
Member

Chan Gurney, Member, 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 0605 November 24, 1959. An investigation was immediately initiated in accordance with the provisions of Title VII of the Federal Aviation Act of 1958. A public hearing was ordered by the Board and held in the Shoreland Hotel, Chicago, Illinois, on January 5 and 6, 1960.

Flight Personnel

Captain Claude Wilbert Helwig, age 40, was employed by Trans World Airlines on September 24, 1945, as a student first officer. On December 2, 1945, he was promoted to first officer and on September 24, 1954, promoted to captain. He held a valid FAA airline transport pilot certificate with rating in the Martin 202/404, Lockheed Constellation, and Douglas DC-4 aircraft. He held a single and multiengine land rating and commercial privileges. Captain Helwig had a total of 12,467 hours, and 1,670 in the Constellation. His latest Class I physical examination was completed on June 18, 1959. His last proficiency checkout was in a Constellation 049 on October 16. 1959, and his last line check was in the same type aircraft on December 17, 1958. The date of his last review of emergency equipment was June 24, 1959. Captain Helwig had been checked out in the 1049G model of the Constellation since July 3, 1956.

First Officer Delmas Earl Watters, age 36, was employed by Trans World Airlines as a student first officer on October 27, 1952; he was promoted to first officer on January 19, 1953; and on December 31, 1958, was promoted to reserve captain. He held a valid airline transport pilot certificate with ratings in the Lockheed Constellation aircraft and had commercial, single-engine land and sea, and multiengine sea privileges. Mr. Watters had a total of 6,285 hours of flying, of which 3,919 hours were in the Constellation equipment. His last proficiency check was accomplished on October 9, 1959, in a flight simulator, model 1649A. His last line check was accomplished on a Constellation, model 049, on May 25, 1959. Mr. Watters' last Class I physical examination was completed on May 18, 1959. The date of his last emergency equipment review was October 9, 1959, and he had been checked out in the 1049G model of the Constellation since August 18, 1955.

Flight Engineer Aerion Lyman Auge, Jr., age 35, was first employed by Trans World Airlines as a student flight engineer on May 4, 1953, and was checked out as flight engineer on September 10, 1953. He held a valid airframe and powerplant rating of an aircraft mechanic certificate; a flight engineer certificate; a pilot certificate, and airframe and powerplant ground instructor certificate He had 5,100 hours flying time in the Constellation as flight engineer His last proficiency check was given on July 10, 1959; his last checkout in the 1049G model of the Constellation was on June 14, 1955; and the date of his last review of emergency equipment was May 22, 1959.

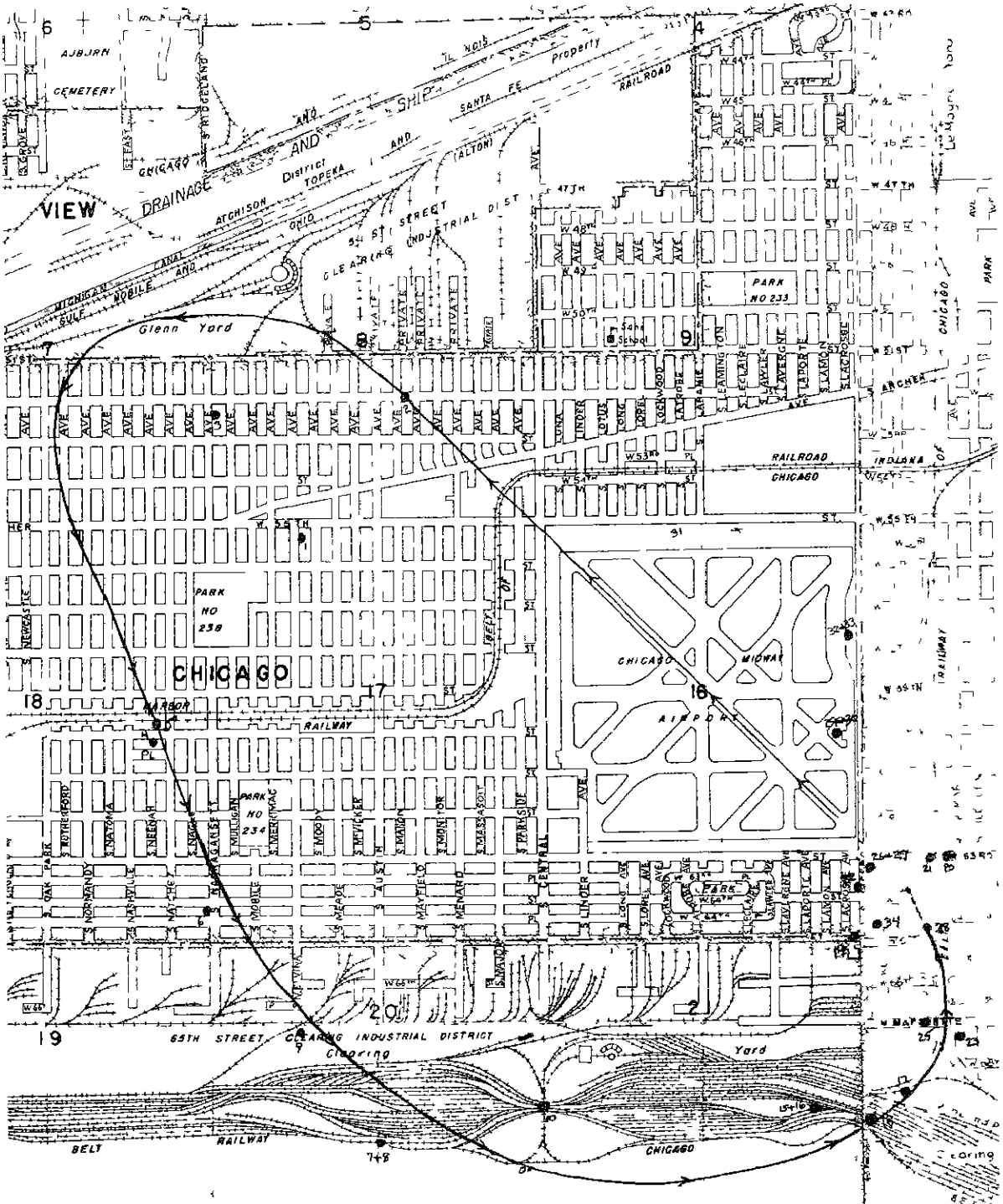
The Carrier

Trans World Airlines, Inc , is a Delaware corporation with principal offices in Kansas City, Missouri This corporation holds a current certificate of public

convenience and necessity for scheduled and nonscheduled operations, and possesses valid air carrier operating certificates for these operations.

The Aircraft

N 102R was a Lockheed Constellation, model L-1049H, manufacturer's number 1252, and bore a manufacturer's date of June 6, 1957. The last base overhaul was accomplished on March 8, 1959, when it had a total time of 3,432:08 hours. It was powered by four Curtiss-Wright 988 turbo compound 18EA-3 engines, with Hamilton Standard propellers, model 43-H60-331. All of the blades were model 6959A-0. Engine No 1 had 1,298 57 hours and its propeller had 194·31 hours since last overhaul. Engine No. 2 had 545 19 hours and propeller No. 2 had 1,594.45 hours since last overhaul Engine No. 3 had 153.13 hours and its propeller had 1,429 35 hours since last overhaul. Engine No. 4 had 476·13 hours and propeller No. 4 had 2 55 hours since last overhaul



BEDFORD PARK

APPROXIMATION OF PROBABLE FLIGHT PATH AS DERIVED FROM WITNESS STATEMENTS

2 1/2 1

Attachment 1