

CIVIL AERONAUTICS BOARD

ACCIDENT INVESTIGATION REPORT

Adopted: July 18, 1951

Released: July 19, 1951

TRANS WORLD AIRLINES, INC.—SKY HARBOR AIRPORT, PHOENIX, ARIZONA,
MARCH 19, 1951

THE ACCIDENT

Trans World Airlines' Flight 59, Constellation Model 749, N-91202, was involved in an accident while making a scheduled landing at Sky Harbor Airport, Phoenix, Arizona, at 0014 MST,¹ March 19, 1951. There were 29 passengers and a crew of five aboard, none of whom was injured. Damage to the aircraft was confined mainly to propellers, flaps, engine nacelles, and the bottom of the fuselage.

HISTORY OF THE FLIGHT

Flight 59 originated in New York, New York, March 18, 1951, destined for Los Angeles, California, with intermediate scheduled stops at St. Louis, Missouri; Kansas City, Missouri; Amarillo, Texas; Albuquerque, New Mexico; and Phoenix, Arizona. The new crew out of Kansas City consisted of Captain L. F. Converse, First Officer Henry B. Nuetzel, Flight Engineer Dino George Valazza, and Stewardesses Mary J. Vaughn and Doris Bartelt. The flight was routine to Albuquerque.

The total aircraft weight on departing Albuquerque was 86,441 pounds, which was within the allowable gross limit of 88,000 pounds, and all disposable load was so distributed as to be within the certificated limits with respect to the center of gravity.

The Albuquerque-Phoenix leg of the flight was flown by First Officer Nuetzel, occupying the right seat, with the captain in the left seat taking over the duties usually performed by the first officer. Upon arrival over Scottsdale² at 0005, the flight was cleared by the Phoenix tower to enter the left traffic pattern to Runway 8L.

¹All times referred to herein are Mountain Standard and are based on the 24-hour clock.

²Scottsdale is located approximately 6 1/2 miles northeast of the Phoenix airport.

While on the down wind leg of the traffic pattern, the flaps were lowered to "takeoff" position. As the turn on to the base leg was made, the landing gear was lowered and the final "before landing" check list was read and acknowledged. The tower was notified that the flight was on base leg approaching the city and in return advised the flight that an American Airlines' plane making a straight-in approach was No. 1 to land and that Flight 59 would be No. 2. In order to establish proper time separation, the flight immediately started a shallow 360-degree turn to the left and so advised the control tower. During this turn the landing gear was retracted. Upon completing the turn and entering the base leg for the second time, the flight was cleared to land. The first officer called for "gear down" and observed the captain reach over to move the operating lever. The captain stated he moved the lever from the up position to what he believed to be the full down position, but that he did not check to see if it was actually in the full down position. As the flight turned in on final the first officer called for "approach flaps" and later "landing flaps," which orders the captain executed.

As the aircraft passed over the approach end of Runway 8L several ground witnesses observed that its landing gear was retracted. When the aircraft was approximately abeam of the control tower, the operator there also observed the gear to be retracted. However, before the flight could be advised of this condition, the aircraft had settled on the runway and slid to a stop. There was no fire and all passengers and crew were evacuated safely.

The Phoenix weather at the time of the accident was skies clear, unlimited visibility, northeast wind six miles per hour.

INVESTIGATION

The aircraft had come to rest 3,500 feet past the approach end of Runway 8L with its landing gear in fully retracted position. It had skidded to a stop, supported by Nos. 2 and 3 engine nacelles, the inboard flaps and the bottom of the fuselage. The first marks on the runway, 1,300 feet past the approach end and near its center, were made by the blade tips of No. 3 propeller. These were followed closely by blade marks of Nos. 4, 2, and 1 propellers in that order. The blades of all four propellers were badly bent or broken. The lower sections of Nos. 2 and 3 engine nacelles were badly crushed and worn from contact with the runway. All wing flaps, which were in the full down position, were extensively damaged as was the bottom of the fuselage between stations 658 and 787.

Upon arrival of the Board investigators the aircraft batteries, which had been removed as a safety measure shortly after landing, were reinstalled and on entering the cockpit, it was found that:

1. The landing gear warning horn did not sound. However, upon moving each throttle back toward its closed position, the horn sounded when the following distances forward of the fully closed position on the quadrant were reached: No. 1—3/8"; No. 2—5/16"; No. 3—3/8"; and No. 4—5/8".
2. The landing gear warning light system indicated all three landing gears to be in the up and locked position.
3. Landing gear operating lever—full "down" position.
4. Wing flap lever—full down.
5. Brake accumulator pressure: No. 1—600 psi and No. 2—800 psi.
6. Boost controls—on.
7. Parking brakes—off.

It was desirable to give the landing gear an operational check with the landing gear operating lever in exactly the same position as found when the cockpit was first entered by personnel of the Board. To prevent its inadvertent movement during preparation for and raising of the aircraft, the gear operating lever was safetied in the down position, as found. The aircraft was then raised with the aid of air bags and placed on wing and nose jacks. It was determined

by examination that all gear well doors were fully closed when the aircraft first made contact with the runway. These doors were removed where an inspection of nacelles revealed both main gears to be in the fully retracted position with gear locks engaged.

The nose gear doors had not touched the runway during the landing and were, therefore, undamaged. This gear was also found fully retracted with up gear locks engaged. The hydraulic main system reservoir was full and the tank aspirator pressure was normal. There was no evidence of any external hydraulic leakage. Before making any tests of the hydraulic system, the landing gear selector valve and gear return line check valve were removed without disturbing the valve control rigging. They were checked for evidence of stuck poppets or foreign matter which might have caused them to malfunction. The condition of both, however, was found to be normal and both were reinstalled.

A hydraulic test cart was then attached to the hydraulic system of the aircraft at a connection provided for that purpose. With the landing gear operating lever in the full down position, as found, hydraulic pressure was applied. When it reached 500 psi all three gears unlocked and upon reaching their full down position again locked. All cockpit warning lights operated normally. The gear was then retracted and again extended, during which cycle everything operated normally; whereupon the aircraft was lowered onto its landing gear and towed from the runway.

All hydraulic and electrical units which could have in any way contributed to a landing gear malfunctioning were then removed and forwarded to the TWA Engineering and Overhaul Base at Kansas City, Missouri, where exhaustive bench tests under the direction of the Board's investigators were conducted.

Upon examination, No. 3 engine driven hydraulic pump showed signs of failing; however, this had not progressed to a point where the pump's ability to maintain the required pressure and output was adversely affected. Tests on all the remaining hydraulic and on all electrical units showed no significant variations from the prescribed performance requirements.

When tested, the landing gear warning horn, which had also been removed, functioned properly with normal audio volume.

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ANALYSIS

It is obvious that the landing gear of N-91202 was fully retracted and locked in that position during the approach and landing at Phoenix. It is likewise true that the landing gear operating lever was found in the full gear down position when the cockpit was first entered by the Board's investigators upon arriving at the scene approximately 4 1/2 hours after the accident.

The captain stated in his testimony with reference to the landing gear being lowered the second time, "Yes sir, I have a distinct recollection of reaching over, because to reach the gear from the left hand side you have to lean over quite a bit, and if your seat is forward you have to lean back slightly to push the handle down. Now, after it was down, after I had pushed it to the down position and said that the down lights were on, I did not reach down again to see if it was down." In answer to a question as to whether he had checked the position he said, "No sir, I did not. You have to lean a little to look at it, but I did not reach down and it being somewhat dark and it could have been half way down or all the way down."

The landing gear operating lever has three locking positions or notches in the lever quadrant. This lever is spring-loaded inward and in order to move it out of any of the three positions—UP, DOWN, or NEUTRAL—it is necessary to pull the lever handle out in order to disengage the locking pawl from the quadrant notches. The quadrant lock will automatically engage itself whenever the control handle is released and the lever comes to rest opposite the notches. The landing gear hydraulic control valve to which the control lever is interconnected has an over-all travel from the full up to full down positions of approximately 90 degrees or 45 degrees either side of neutral. However, during the first 20 degrees of this valve movement from neutral in either direction, no effective line pressure is applied. The effective valve travel, therefore, is confined to the last 25 degrees of movement in either direction.

The landing gear operating lever was in the "up" position when Captain Converse

undertook to comply with the first officer's gear "down" order. Since it is now apparent that the landing gear never left the up and locked position, it must be presumed that the captain moved the operating lever only from the "up" to the neutral position, or if beyond that point, not enough to move the selector valve the amount necessary to get effective pressure to the down gear lines.

In the light of the above and the fact that during the tests the gear functioned normally when hydraulic pressure was applied, the Board concludes that the landing gear operating lever was placed in the full down position after the aircraft was on the ground.

The statements of the crew that they did not at any time hear the landing gear warning horn have been given careful consideration. However, in view of the fact that when the throttles were retarded to positions varying from 3/8 to 5/8 inches forward of fully closed, the warning horn functioned normally, it must also be concluded that either the throttles were not retarded sufficiently during the approach and landing to actuate the electrical switch with which each is equipped or the crew failed to hear the horn if it blew.

FINDINGS

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

1. The company, the aircraft and the crew were properly certificated.
2. The flight was cleared to enter the Phoenix traffic pattern and the landing gear was lowered.
3. After turning onto the base leg, the flight was advised they were No. 2 to land, whereupon to establish proper time separation a shallow 360-degree turn was made and the landing gear was retracted.
4. Upon being cleared No. 1 to land, the captain moved the landing gear operating lever toward the gear "down" position but made no check to determine if it actually reached that position.
5. The aircraft landed with the gear in the fully retracted and locked position.

6. The landing gear functioned normally when tested after the accident.

PROBABLE CAUSE

The Board determines that the probable cause of this accident was failure of the captain to place the landing gear operating lever in a full gear "down" position and to make the necessary checks to determine its position before the landing was made.

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BY THE CIVIL AERONAUTICS BOARD:

/s/ DONALD W. NYROP

/s/ OSWALD RYAN

/s/ JOSEPH P. ADAMS

/s/ CHAN GURNEY

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

Supplemental Data

INVESTIGATION AND HEARING

The Civil Aeronautics Board received notification of the accident through the Civil Aeronautics Administration Communications Station at the Los Angeles International Airport at 0025, March 19, 1951. 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 held in connection with the investigation of this accident at Santa Monica, California, April 4, 1951.

AIR CARRIER

Trans World Airlines, Inc., is a Delaware corporation with its principal place of business at 10 Richards Road, Kansas City, Missouri. Trans World Airlines possesses a certificate of public convenience and necessity issued by the Civil Aeronautics Board and an operating certificate issued by the Civil Aeronautics Administration. These certificates authorized the carriage of persons, property, and mail over the routes described in this report.

FLIGHT PERSONNEL

The captain, Laurence F. Converse, age 38, was first employed by TWA January 12, 1940. He was made reserve captain December 11, 1941, and after returning from a tour of

duty with the U. S. Army was made captain September 4, 1945. He holds a valid airline transport pilot rating. He had a total of 7,765 hours and 29 minutes flying time of which 1,045 hours and 30 minutes were in the type of aircraft involved. His last CAA physical was accomplished February 19, 1951. His last line check was February 24, 1951.

First Officer Henry B. Nuetzel, age 36, was first employed by TWA July 17, 1945. He was made a reserve captain September 21, 1948. His total flying time was 5,995 hours and 2 minutes of which 1,250 hours and 8 minutes were in the type of aircraft involved. He holds a valid airline transport pilot rating and was given his last line check on November 21, 1950. His last CAA physical was accomplished September 30, 1950.

The other crew members consisted of Flight Engineer D. G. Valazza, age 41, and Stewardesses Doris Bartelt and Mary J. Vaughn.

THE AIRCRAFT

N-91202, a Lockheed Constellation, Model 749, was manufactured April 2, 1948, by the Lockheed Aircraft Corporation, Burbank, California. An examination of all historical maintenance and inspection records of this aircraft disclosed no items which had any particular significance in respect to this accident.