

CIVIL AERONAUTICS BOARD

ACCIDENT INVESTIGATION REPORT

Adopted: February 9, 1955

Released: February 14, 1955

TRANS WORLD AIRLINES, INC. - FORT WAYNE, INDIANA,
SEPTEMBER 13, 1954

The Accident

The main landing gear of N 40441, a Martin 404 owned and operated by Trans World Airlines, Inc., as Flight 521, partially retracted during a landing roll at Baer Field, Fort Wayne, Indiana, on September 13, 1954, at 0920 c. s. t. ^{1/} None of the crew of three was injured; a few of the 30 passengers received bruises in leaving the aircraft. Aircraft damage was confined to the propeller tips and the rear bottom of the fuselage; there was no fire.

History of the Flight

Flight No. 521 originated at Baltimore, Maryland, for Kansas City, Missouri, with stops scheduled at Washington, D. C.; Wheeling, West Virginia; Columbus, Ohio; Fort Wayne, Indiana; and Chicago, Illinois. Captain Bud Edward Wielt, First Officer Joseph Bernard Skiba, and Stewardess Mildred L. Odell, comprised the crew.

There were no reported irregularities during any segment of the flight including the final one from Columbus. Gross weight of the aircraft upon departure from that point was 42,296 pounds (maximum allowable was 43,650 pounds) and its center of gravity was located within prescribed limits.

Flight 521 reported to the Baer Field control tower at Fort Wayne at 0913 giving its position as 10 miles southeast of the airport. It was given local traffic and landing information and was requested to report again when turning on base leg of approach to runway 22. At 0918 the flight reported on base leg and was cleared by the tower to land.

The aircraft made a smooth touchdown following which the main landing gear partially retracted allowing the propeller tips to strike the runway. As the aircraft settled its weight was supported by the extended nose gear and bottom rear section of the fuselage. It skidded down the runway coming to rest on the runway to the west of its junction with runway 13-31 at a point 3,325 feet from the approach end. The passengers were evacuated through emergency exits on both sides of the fuselage over the wings. City and National Guard emergency equipment located on the airport was alerted by the control tower and started for the scene before the aircraft came to rest.

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

Investigation

Weather at the time and place of the accident was, ceiling and visibility unlimited, wind west-southwest 13, altimeter 30.15, temperature 68, and dew-point 51. The landing on runway 22 was thus practically into the wind.

Both the approach and touchdown appeared normal to ground witnesses and seemed normal and smooth to the crew. Although the exact point of touchdown could not be determined because of a profusion of old tire marks on the runway, the captain estimated it was about 600 feet from the approach end and the first officer thought it was between 500 and 600 feet. The runway is 6,260 feet long.

Both the main landing gears partially retracted but remained protruding from the wheel wells. The nose wheel remained fully extended as the aircraft came to rest.

When the landing was made the captain was occupying the left pilot's seat and the first officer the right. The latter made the approach and landing while the captain performed the duties of first officer. Captain Wielt stated that when the aircraft was firmly on the runway the first officer called for flaps up, cowl flaps open and props full increase r. p. m. The captain started the flaps up and, according to his testimony, while his right arm was brought back from the flap control (which is on the right side of the pedestal and has a spherical knob) his right hand struck the landing gear lever. He at once noted that the landing gear control was above its neutral position. He quickly actuated the control back to the down position but the propeller tips began striking the runway almost immediately.

Both pilots stated they were certain there had been three green lights during the approach and that the red light was not on, signifying all three wheels were locked in down position. They further stated the landing was without skip or bounce after initial contact of the wheels with the runway. According to the crew there was no intention of using propeller reversal on this landing, as the runway was long, the touchdown was in average location, and there was a checking wind of 13 m. p. h. from south-southwest. Both crew members stated they did not recall hearing the warning horn at any time during the landing.

The underside of the fuselage from five feet aft of the trailing edges of the wings to a location directly under the rudder post was severely damaged by scraping on the runway. Several sections of the skin were completely worn away, and supporting stringers, frames and brackets were fractured and bent. All tips of the propeller blades were damaged and bent and pieces of the right propeller were broken off on impact. The right main landing gear door was damaged by abrasion and distorted by the protruding wheel. The main loading door in the rear of the fuselage was damaged by runway abrasion and could not be opened since the rear fuselage bottom was resting on the runway, thus preventing its use as an exit. Both engine mounts were cracked. Pieces from the right propeller had punctured the side of the fuselage in two places. Cockpit instrument readings as determined shortly after the accident were normal.

The flight log in the aircraft contained entries from September 7, 1954, to the date of the accident; however, there was no entry that indicated any unairworthiness of the aircraft. Testimony of the crew disclosed that the flight from Columbus to Fort Wayne was normal.

The aircraft was raised with air bags and jacks. During this process, the wheels of the main gear remained on the ground and the gear down locks readily engaged. The aircraft was then towed to a hangar and placed on jacks to permit full landing gear retraction and extension tests. Several cycles of the landing gear were made using auxiliary hydraulic pressure and no irregularity could be found in either the functioning of the landing gear or its warning system. Except for the damaged right gear doors, which were removed, these tests were conducted without any alteration, replacement, or repair. The landing gear cycled normally except that its movement was slower due to the lower hydraulic pressure capacity of the auxiliary power unit. The safety switch on the nose gear torque link was manually operated. The landing gear lever locking solenoid in the cockpit control pedestal actuated properly and the T handle on top of the pedestal moved to the normal "up" position.

The gear actuating control handle is located on the left side of the pedestal and has a cube-shaped knob at the end of the handle. The neutral position of this control is in the center of a vertically placed quadrant. The release of control is accomplished by lifting slightly and pulling the handle out of its detent against the pressure of a light spring. If the weight of the aircraft is compressing the gear's shock struts enough to actuate any one of the safety switches, the control handle cannot be moved to the "up" position on the quadrant. This safety factor, which is designed to minimize inadvertent retraction of the gear while on the ground, functioned normally. A movement of the gear's control handle to the "up" position is possible even though the aircraft does not skip or bounce during a landing, if none of the shock struts are compressed by the weight of the aircraft to the point where a safety switch is actuated. It is necessary that the struts compress approximately two inches before they actuate the switches. Any one, or any combination of these struts, if compressed to this point, will prevent inadvertent retraction.

Investigation further disclosed that Captain Wielt and First Officer Skiba had made one previous flight together as a team.

Analysis

As indicated the first officer, who was occupying the right seat, made the landing. The captain, on the left, actuated the landing gear and flap controls. He lowered the landing gear during the approach and noted that all three lights, indicating full down and locked condition, were on. After a smooth touchdown and with the wheels lightly on the runway the first officer ordered flaps up. The captain complied. As the flap lever is at the right of the pedestal, it was necessary for the captain to reach beyond the landing gear lever which is at the left of the pedestal. He states that as he brought his hand back apparently the heel of the hand struck the landing gear lever

upwardly and the landing gear started up. This upward motion of his hand is understandable as his next action would be to reach immediately, as a continuation of his hand motion, for the cowl flap switches located on the overhead panel. The captain instantly saw the landing gear lever above its neutral position (toward "up") and quickly pulled it down past neutral to the "down" position. However, the wheels had, even in that short period of time, started to retract and the weight of the aircraft then took command of the situation, forcing the main wheels upward until the aft portion of the fuselage was scraping the runway. This is believed to be the most logical explanation of the landing gear retraction and one that seems to be entirely plausible.

As stated, the nose gear was found down and locked. It may well have become unlocked at the same time as the main gear. However, the fast and slightly nose high landing probably allowed time for it to return to the full down and locked position when the captain actuated the control handle to the down position.

Following this accident all company pilots were advised of the circumstances and in addition the carrier initiated a comprehensive program designed to preclude further occurrences of this type. A guard has been installed over the landing gear control handle and deliberate action on the part of the pilot is now required before the handle can be actuated. TWA is also in the process of installing on all of its Martin M-404 aircraft deceleration switches which will lock the gear in "safety" immediately upon touchdown. Further, in the belief that weak spring tension could possibly have contributed to the ease with which the gear handle was displaced from its normal position, TWA conducted a fleet campaign immediately following the accident to insure that the tension of the handle detent springs on all of the M-404's was within the prescribed tolerance.

The Board concurs with this action by the carrier and has recommended to the Administrator that consideration be given to incorporating these additional safety features on all other aircraft of this type.

Findings

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

1. The carrier, the aircraft and the crew were properly certificated.
2. The aircraft was properly loaded and dispatched.
3. The weather was excellent and not contributory to the accident.
4. The landing gear struts had not been compressed by the aircraft's weight when the landing gear lever was accidentally moved from the neutral position.
5. The entire landing gear system was functioning properly prior to the accident.
6. The entire landing gear system functioned properly upon thorough test immediately after the accident.

Probable Cause

The Board determines that the probable cause of the accident was the accidental retraction of the landing gear during the early stages of the landing before the safety system became effective.

BY THE CIVIL AERONAUTICS BOARD:

/s/ CHAN GURNEY

/s/ HARMAR D. DENNY

/s/ JOSH LEE

/s/ JOSEPH P. ADAMS

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

Special Investigation

The Civil Aeronautics Board was notified of this accident immediately after occurrence on September 13, 1954. 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 special investigation was ordered by the Board and in connection therewith depositions were taken at Fort Wayne, Indiana, on October 11, and at Kansas City, Missouri, on October 13, 1954.

Air Carrier

Trans World Airlines, Inc., is a scheduled air carrier incorporated in the State of Delaware with its principal business office at Kansas City, Missouri. It operates under a currently effective certificate of public convenience and necessity issued by the Civil Aeronautics Board and an air carrier operating certificate issued by the Civil Aeronautics Administration. These certificates authorize the company to transport by air persons and property over numerous routes, including that between Baltimore, Maryland, and Fort Wayne, Indiana.

Flight Personnel

Captain Bud Edward Wielt, age 34, held a currently effective airline transport pilot certificate with an appropriate rating for the subject aircraft. He had been continuously employed by Trans World Airlines, Inc., since 1944. At the time of the accident he had accumulated 9,700 hours of piloting, of which 1,639 had been in Martin Model 404 aircraft.

First Officer Joseph Bernard Skiba, age 30, held a currently effective airline transport pilot certificate with an appropriate rating for the subject aircraft. He had been employed by the company since June 1953. His total flying as of the time of the accident was 1,437 hours, of which 215 hours had been in Martin 404 aircraft.

Stewardess Mildred L. Odell had been employed by Trans World Airlines, Inc., since June 1954, and had made approximately 15 flights.

The Aircraft

N 40441 was a Martin Model 404 manufactured in September 1952. The two engines were Pratt & Whitney Model R-2800 and the propellers were Hamilton Standard Hydromatic Model 43E60. The aircraft had had a total time of 4,377 hours. The flight record in the aircraft which covered the past 30 days indicated there had been no pilot complaints relative to the landing gear or its relating components.

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