

CIVIL AERONAUTICS BOARD  
AIRCRAFT ACCIDENT REPORT

Adopted: July 15, 1963

Released: July 18, 1963

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ALLEGHENY AIRLINES, INC., CONVAIR 340/440, N 8415H,  
NEAR BRADLEY FIELD, WINDSOR LOCKS, CONNECTICUT  
OCTOBER 19, 1962

SYNOPSIS

Allegheny Airlines Flight 928, a Convair 340/440, while descending to land at Bradley Field, Connecticut, experienced an explosive decompression when the rear service door became disengaged at its lower latch points. The ensuing outward rush of air ejected a hostess who was near the door opening.

Following departure from Philadelphia, a high-frequency whistling noise was heard and inspection revealed an escape of air at the lower aft corner of the rear service door. Pillow cases were placed in this area to reduce the air noise but no further action was taken until the door blow-out occurred after descending through 4,000 feet. At no time was the pressurization system intentionally deactivated.

The Board determines that the probable cause of this accident was an undetected insecure latching of the rear service door, resulting in an inflight explosive decompression which ejected a hostess from the aircraft.

Contributing factors were Allegheny Airlines' inadequate emergency pressurization instructions, and the continuation of pressurized flight after discovery of the pressurization leak.

Investigation

Allegheny Airlines Flight 928, a Convair 340/440, N 8415H, was a scheduled passenger flight from Washington, D. C., to Providence, Rhode Island, with enroute stops at Philadelphia International Airport, Philadelphia, Pennsylvania, and Bradley Field, Windsor Locks, Connecticut. The flight departed Washington National Airport on schedule at 1845<sup>1/</sup>, October 19, 1962. The aircraft was released with the gross weight and center of gravity within prescribed limits. The crew consisted of the captain, first officer, first and second hostesses. The flight to Philadelphia International Airport was routine and conducted under Visual Flight Rules (VFR). The captain subsequently stated that the air was smooth at the cruising altitude of 5,500 feet.

Flight 928 was released at Philadelphia with the gross weight and center of gravity within prescribed limits. Forty-eight passengers and the crew of four were aboard. After the right engine was started, and prior to starting the left engine, the crew noted that both the passenger door and the rear service door warning lights were on, indicating that these doors were open. Hand signals were exchanged between the flight crew and the ramp agent indicating that the rear service door was insecure. The ramp agent stated that he then climbed on a ground power unit, which was driven beneath the aircraft, and closed the rear service door. While the ramp agent was closing the rear service door, the second hostess informed the captain that she was having trouble closing the passenger door and the first officer left the cockpit to assist her. The captain stated that upon the return of the first officer, all door warning lights indicated that the doors were closed and locked.

<sup>1/</sup> All times herein are Eastern Daylight based on the 24-hour clock.

When the ramp agent returned to his normal position by the nose of the aircraft, the captain gave him the all clear signal indicating that the doors were properly closed. The agent stated, "I could see this myself as all red lights were out." These warning lights are located on the first officer's overhead console and were visible from the ramp agent's position.

The flight departed Philadelphia International Airport during the hours of darkness at 1955 hours on a VFR flight plan. The cabin pressurization system was activated. Approximately five minutes after takeoff, during the climb to cruising altitude, the first hostess informed the captain of a noise emanating from the rear service door. The first officer said that the door warning lights were still out. He then accompanied the hostess to the rear of the cabin where a high-pitched sound was audible. The first officer explained "I immediately checked the door handle; it was in the locked position. I then moved over to the door and checked the overhead door latches; they were in the locked position. I knelt down by the door, placing my left arm around a stanchion in the galley compartment and pushed forward on the door handle with my right hand. It was in the full forward or locked position. The bottom latches not being visible, I put my hand down at the bottom of the door and felt at the bottom latches; they felt to be locked . . . I took some paper from the beverage glass box and dropped it around the door to see if I could find a leak around the door. I could not find any . . . I then went to the cockpit and advised Captain Gould that I could not find anything wrong with the door but there was noise coming from around the rubber seal."

The first officer was then instructed by the captain to attempt to stop the noise. The first hostess removed the covers from several pillows and these covers were dampened and placed on the rear side of the door in the area where the rubber seal was visible. This stopped the high-pitched noise and the first officer returned to the cockpit.

The flight was continued at the cruising altitude of 5,500 feet with sea level cabin pressure maintained. Although pressurization was not required at this altitude, the captain stated that pressurization was maintained for passenger comfort. In the vicinity of the Trinity Very High Frequency Omnidirectional Range, approximately 57 nautical miles from Bradley Field, light turbulence was encountered and the captain turned on the "fasten seat belt" sign. A few minutes later, the turbulence subsided but the sign was left on in anticipation of the descent to Bradley Field. Shortly thereafter, a gradual descent was commenced.

Bradley Approach Control was contacted and Allegheny Flight 928 reported being about 10 miles southwest of the WTIC radio tower which is located near Bradley Field. This transmission was acknowledged and the flight was instructed to make a straight-in approach to runway 6. The Bradley Field weather was: clear skies and visibility more than 15 miles.

Just after passing through the 4,000-foot level, at approximately 2052 hours, there was an explosive decompression; simultaneously, this was felt in the cockpit and the service door warning light illuminated. The decompression tore off the cockpit-cabin door which was blown approximately eight feet down the cabin aisle. At the moment of decompression, the second hostess was in the lavatory. The decompression ripped the lavatory door from its hinge.

and forced its occupant to the floor. The first hostess, who was in the buffet area, was ejected through the rear service door which had blown open, and fell to her death.

Bradley Tower was advised of the accident and subsequently a priority landing was requested. The aircraft landed at 2058 hours.

Investigation by the Civil Aeronautics Board at Bradley Field disclosed that the lower edge of the rear service door was one foot away from the lower lock pins and twisted rearward. The upper latching hooks were over the upper lock pins; however, the hooks were twisted and bent outward. The door handle was in the open position, aligned with the "open" reference arrow painted on the door fabric.

The parallelogram door hinge had separated at the horizontal and diagonal tubular cross members (see attachment). The vertical portion remained attached to the fuselage and the horizontal portion separated at the attachment to the interior of the door. The upper idler bar and the assist arm were separated. The attachment of the assist arm to the interior surface of the door was intact, allowing the arm to become wedged between the door and jamb at the aft side.

The rear service door was removed from the aircraft, under CAB supervision, and the warning system was checked. Two plunger type switches are utilized in the warning light circuit; their operation is dependent upon the engagement or disengagement of the upper and lower forward latching hooks. There are no indications of the position of the two rear latching hooks in the warning system. The door warning light, located

over the first officer's station, went off when the plunger-type switches at the upper and lower forward lock pins were depressed simultaneously. The light was on with both switches released and stayed on when either switch was depressed independently.

The aircraft was ferried to the Allegheny Airlines main base at Washington National Airport, with the rear service door stowed aboard. This door was reinstalled with the replacement of damaged parts. Inspection holes were cut in the outer skin of the door to observe the operation of the lower latching hooks. The two upper latching hooks which were distorted were replaced.

The door was reinstalled and efforts made, on the ground, to duplicate the unsafe door condition which caused this accident. When closing the door all four hooks went into place and the door warning light went off. The door was reopened and when slammed shut the two upper hooks and the lower forward hook went into place over the lock pins, and again the door warning light went off, even though the lower aft hook was not fully engaged.

The door was partially closed, sufficient to trigger the lower latching hooks actuating plunger, quickly opened, then slammed and locked; the lower aft hook was again insecurely positioned over the lock pin, the door warning light was off and the door appeared to be properly secured. With the door in this semi-latched configuration, the cabin was pressurized to 2.1 pounds per square inch (p.s.i.) differential, the equivalent of 4,200 feet altitude, based on standard day conditions. The pressurization was obtained from the aircraft system by operating the No. 2 engine. As a

result of pressurization and engine vibration, the door handle progressed slowly one and one-half inches toward the "open" position. The door handle could not then be moved manually toward the "locked" position. The cabin was then depressurized normally. During the depressurization, the door handle progressed further toward the "open" position. Upon reaching a 0.5 p.s.i. differential pressure, the rear service door popped outward at the bottom, hinging about the two upper hooks which remained engaged.

At the time of the accident, the cabin-to-ambient pressure differential was computed to be approximately 1.7 p.s.i. based on standard day conditions.

Allegheny Airlines Convair aircraft were placed into operation in April 1960, and since that date Allegheny had recorded seven inadvertent inflight rear service door openings. Three of these occurrences, including the subject accident, involved Convair N 8415H.

As early as 1954, Convair recognized the deficiencies existing in the rear service door and issued the first of several Convair 340/440 Service Bulletins recommending appropriate modifications. These Service Bulletins were available to Allegheny Airlines in their Maintenance Manuals; however, the majority of the modifications were not incorporated in N 8415H.

The Allegheny Airlines Operations Manual containing emergency instructions to the flight crew was very brief in reference to inflight emergency procedure pertaining to rear service door or window pressurization leaks. The manual required the flight crew upon "Evidence of window, door or hatch failure; dump immediately." <sup>2/</sup> However, there were no specific

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<sup>2/</sup>Referring to actuation of depressurization by the use of dump valves, which provides for rapid cabin depressurization.

instructions requiring any action on the part of the flight crew in the event of an impending pressurization failure. Currently effective operations instructions now provide comprehensive pressurization instructions and emergency procedures.

### Analysis and Conclusions

It was determined that the flight was properly dispatched and the flight crew and aircraft were currently certificated in accordance with existing Civil Air Regulations and company procedures.

Investigation at Bradley Field, and later at Washington National Airport, established that electro-mechanical continuity existed in the rear service door warning light system. However, this system does not indicate the position of the two aft latching hooks.

The closing procedure of the rear service door at Philadelphia resulted in an insecure engagement of the aft lower latching hook over its lock pin. The improper latching of the service door was not indicated by the warning light and would be difficult to detect by reference to the position of the door handle. The slight displacement from the locked position could easily have been overlooked in a visual inspection. The ease with which a potentially dangerous condition could exist was demonstrated in the ground tests previously described.

It is concluded that the partially engaged lower aft latching hook remained in this configuration during the climbout from Philadelphia and subsequent cruising flight. The descent to Bradley Field, with the resulting decrease in pressure differential, lessened the tension on the partially



engaged latching hook against the lock pin. The insecurely positioned lower aft latching hook allowed the lower portion of the door to be distorted by pressure which, when assisted by aircraft vibrations, caused the door handle to move toward the open position. When this hook became disengaged, further distortion of the door occurred and the door handle traveled to the fully open position thereby disengaging the forward lower hook, resulting in explosive decompression. Immediately prior to the decompression, assuming a pressure differential of 1.7 p.s.i., the total force exerted on this door would have been in excess of 3,000 pounds. Therefore, it can be concluded that anyone adjacent to this door during explosive decompression would be ejected from the aircraft.

Although the flight crew took reasonable precautions to determine that the service door was secure, it is evident that their analysis of the leak to be the result of a door seal was in error. In view of the history of many inadvertent openings of the service door experienced by Allegheny in operating the Convair 340/440 aircraft, the Board believes that the crew should have exercised the precaution of depressurizing the aircraft, and warned the flight attendants and passengers to avoid the rear service door area.

#### Probable Cause

The Board determines that the probable cause of this accident was an undetected insecure latching of the rear service door resulting in an in-flight explosive decompression which ejected a hostess from the aircraft.

Contributing factors were Allegheny Airlines' inadequate emergency pressurization instructions, and the continuation of pressurized flight after discovery of the pressurization leak.

Recommendation

Convair Service Bulletin 126A, dated June 1, 1954, recommended improvements in the door latch and warning system. The Civil Aeronautics Board, on March 15, 1955, recommended to the Administrator of the Civil Aeronautics Administration that an Airworthiness Directive be issued which would have made mandatory the changes noted in this Convair Service Bulletin. The Civil Aeronautics Administration issued Air Carrier Maintenance Alert Bulletin No. 203, which called attention to the difficulties experienced with this door and encouraged compliance with the Convair Service Bulletin. Additional Convair Service Bulletins dated May 1955, October 1956, February 1957, September 1957, and January 1958, were issued recommending improvements in the rear service door.

N 8415H was purchased by Allegheny Airlines and subsequently placed into operation on April 12, 1960. The provisions of Convair Service Bulletin 126A were incorporated in N 8415H; however, the majority of the Convair Service Bulletins pertaining to rear service door improvements were not incorporated in N 8415H prior to purchase nor subsequently by Allegheny.

On November 5, 1962, the Board recommended to the Federal Aviation Agency that methods for improving the Convair 340/440 rear service door system be considered, and that the adoption of these improvements be of a mandatory nature. Consequently, the Federal Aviation Agency issued an Airworthiness Directive, effective December 18, 1962, making mandatory the modification of

Convair 340/440 rear service doors incorporating improvements contained in Convair Service Bulletins.

This Airworthiness Directive requires, among other pertinent items, that:

1. The Airplane Flight Manual be revised to require inspection of the latching before takeoff and each time the rear service door is operated;
2. The aircraft be depressurized if there is evidence of a latch disengagement or leakage around the door;
3. Inspection holes and lights be installed for inspection of the lower door latches; and
4. Door latching electrical warning switches be installed in the upper and lower forward latches.

BY THE CIVIL AERONAUTICS BOARD:

/s/ ALAN S. BOYD  
Chairman

/s/ ROBERT T. MURPHY  
Vice Chairman

/s/ CHAN GURNEY  
Member

/s/ G. JOSEPH MINETTI  
Member

/s/ WHITNEY GILLILLAND  
Member

## S U P P L E M E N T A L   D A T A

### Investigation

The Civil Aeronautics Board was notified of this accident at 2130 hours on October 19, 1962. Civil Aeronautics Board Investigators were immediately dispatched to the scene and an investigation was conducted in accordance with the provisions of Title VII of the Federal Aviation Act of 1958, as amended.

### Air Carrier

Allegheny Airlines, Inc. holds a current certificate of public convenience and necessity issued by the Civil Aeronautics Board to engage in the transportation of persons, property, and mail. It also possesses a valid air carrier operating certificate issued by the Federal Aviation Agency.

### Crew

Captain Harold E. Gould, age 39, holds a valid Federal Aviation Agency airline transport pilot certificate with ratings for the Martin 202, 404, Convair 340/440, Convair 540. Captain Gould has a total of 14,450 flying hours of which 1,800 were in the Convair 340/440.

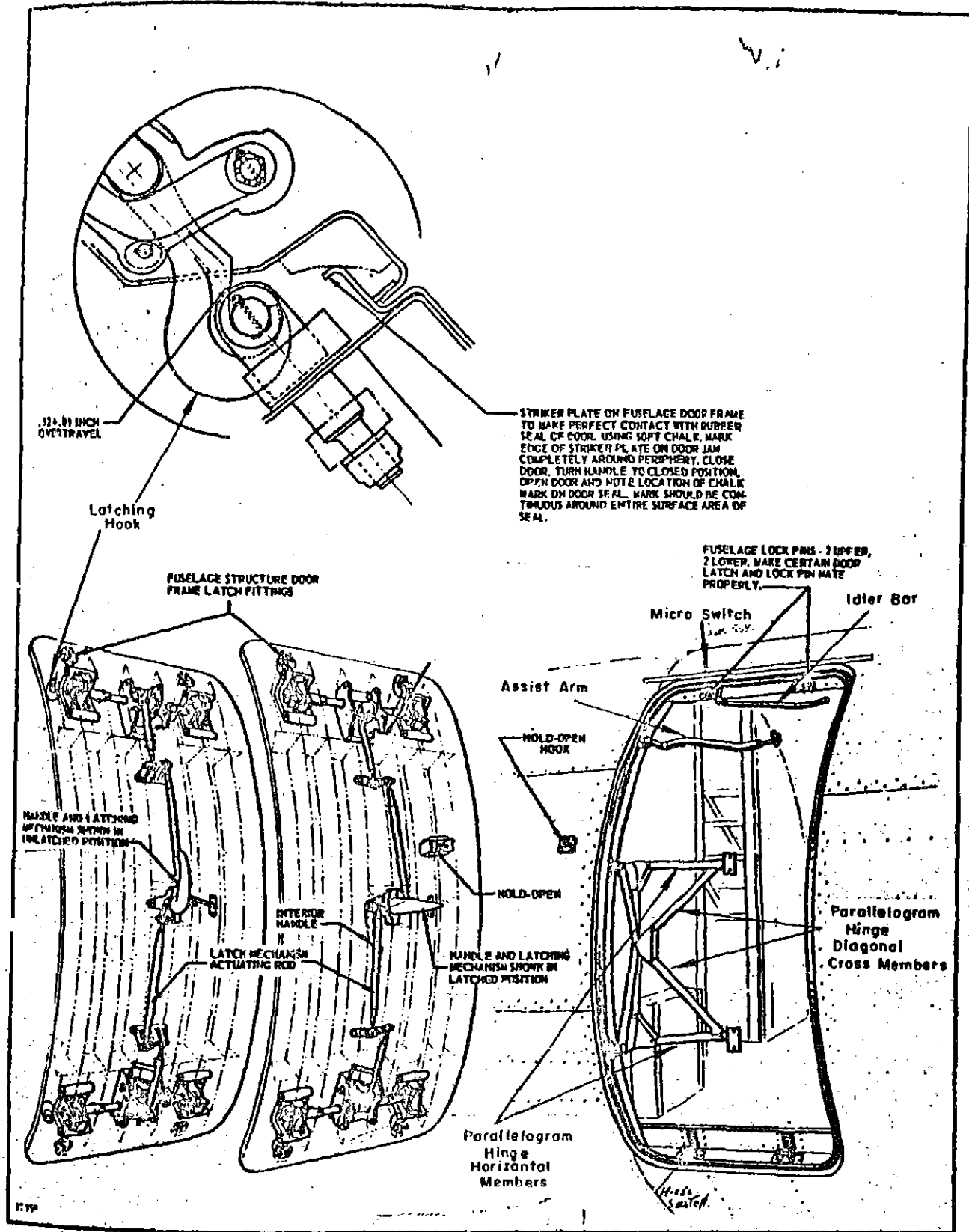
First Officer Harold T. Hawkins, age 34, holds a valid Federal Aviation Agency commercial pilot certificate and instrument rating. He has approximately 9,000 flying hours of which an estimated 1,700 hours are in Convair aircraft.

First Hostess Francoise De Moriere, age 29, had an estimated flying time of 1,680 hours, approximately 440 hours of which were in Convair type aircraft.

Second Hostess Katherine Lacy, age 20, has 135.5 hours of flying time of which 79.3 hours were in Convair type aircraft.

### The Aircraft

The aircraft is a Convair 340/440, U. S. Registry N 8415H, owned and operated by Allegheny Airlines, Inc. It was manufactured on October 14, 1953, serial No. 125. The total time on the airframe was 20,960:11 hours at the time of the accident. The engines are Pratt & Whitney, model R-2800 CB-16, with Hamilton Standard propellers, model 43E60.



15 July 1954  
48 Series

Figure 3.2.104 Rear Service Door