File No. 1-0037

# CIVIL AERONAUTICS BOARD

# AIRCRAFT ACCIDENT REPORT

**ADOPTED:** June 19, 1964 **RELEASED:** June 25, 1964

FRONTIER AIRLINES, INC.
CONVAIR 340, N73130
GRAND ISLAND, NEBRASKA
DECEMBER 21, 1962

## SYNOPSIS

Frontier Airlines Flight 363 of December 21, 1962, a Convair 340, N73130, regularly scheduled between Kansas City, Missouri, and Denver, Colorado, with several en route stops, crashed during an approach to the Grand Island Municipal Airport, Grand Island, Nebraska, one of the planned stops at 2030 c.s.t.

Both pilots and three of the 40 passengers were injured; there were no fatalities. Impact and subsequent fire destroyed the aircraft.

The Board determines the probable cause of this accident was failure of the crew to monitor altitude properly during a landing approach.

## Investigation

Frontier Airlines (FAL) Flight 363 of December 21, 1962, a Convair model 340, N73130, crashed during an approach to the Grand Island Municipal Airport, Grand Island, Nebraska, on December 21, 1962, at 2030 c.s.t.1/ Both pilots and three of the 40 passengers were injured. There were no fatalities. Impact and subsequent fire destroyed the aircraft.

Flight 363 was regularly scheduled between Kansas City, Missouri, and Denver, Colorado, with stops at St. Joseph, Missouri, Omaha, Lincoln, Grand Island, North Platte, and Scottsbluff, all in Nebraska. The first three legs of the flight were without incident except for a half inch ice accretion on the aircraft, between St. Joseph and Omaha. This ice was not sufficient to affect flight, according to the crew. Slush slid from the fuselage while on the ground at Omaha and the aircraft was free of ice upon departure from Omaha.

Arrival at Lincoln was at 1911 and the aircraft was refueled to a total of 820 gallons. No maintenance was requested or performed at Lincoln. Departure from Lincoln for Grand Island was at 1947. The aircraft's gross weight was 46,725 pounds, 275 pounds less than the maximum allowable, and the aircraft's center of gravity was within prescribed limits. In accordance with company procedure the captain and the first officer alternated flying the several legs of the flight with the first officer flying the Lincoln-Grand Island leg from the right seat.

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

The instrument flight rules (IFR) flight plan specified a cruising altitude of 6,000 feet m.s.l. to the Grand Island VOR,[2] via Victor Airway 138. There was no control tower at Grand Island.

FAL 363 proceeded on course as cleared, at 6,000 feet m.s.l. The flight later was cleared to 4,000 feet m.s.l. which was approximately 800 feet above clouds. Approaching Grand Island, FAL 363 was in radio contact with eastbound FAL 364. At that time FAL 363 learned that FAL 364 had passed up its planned landing at Grand Island because of the weather and was proceeding to Lincoln. Denver Air Route Traffic Control Center (ARTCC) issued FAL 363 approach clearance to Grand Island at 2005. The captain testified that the altimeter setting of 29.86 inches reported at this time was the last altimeter setting received. At 2007 the Grand Island Flight Service Station (FSS)[3] gave the flight the 2003 local weather observation: special, ceiling indefinite 100 feet, obscuration, visibility 3/4 mile in fog, wind south 8, altimeter 29.82. FAL 363 responded with a request for clearance to North Platte, Nebraska, which was subsequently granted.

The flight arrived over the Grand Island Airport at about 2015. It advised the FSS the runway lights and beacon were visible and the weather to the west appeared to be clear. The flight also asked for further weather observations and clearance to hold. At 2018 the FSS gave the flight the 2015 weather observation: special, partial obscuration, visibility 3/4 mile, fog, wind south 10 knots, altimeter setting 29.81, stars visible overhead, 6/10 of sky obscured by fog. Instructions were also issued to hold north on the 016 radial of the Grand Island VOR with an expected approach clearance time of 2040. The flight asked the reason for the delay. In response the FSS then obtained approach clearance from Denver ARTCC and delivered it to the flight at 2027. The flight acknowledged and indicated a contact approach[4] would be made. This was the last radio contact with Flight 363.

The first officer, who was flying, started the approach to runway 17 which does not have approach lights nor Instrument Landing System. At the time the aircraft was northbound in the holding pattern of the Grand Island VOR. A 90 degree left turn, then a 270 degree right turn was accomplished which aligned the aircraft with the runway. The following sequence of events was described by the captain and substantiated by the first officer. The captain stated "... We completed the approach checklist and made a turn north of the low frequency range (8391 feet from the threshold of runway 17) which was visible as we went over it. The area around the range and the south half of the distance to the airport was absolutely clear. Our path was one which had the runway lights clearly aligned. (The runway lights were on at position 3 which is medium intensity.) The approach was a normal gradual descent. The radios were tuned to the low frequency range and the Omni. Since we were not ready to land our checklist was complete with the exception of approach flaps and landing flaps and ADI on.

"Bearing down the centerline of the lights 300 to 400 feet above the ground and approximately a mile from the end of the runway, we encountered a bank of scud

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2/ Very high frequency omnidirectional radio range.

3/ An FSS is an FAA facility providing assistance and advisory information to promote the safe conduct of flight.

4/ A contact approach is one executed during instrument weather conditions by means of visual reference to the ground.

or ground fog that was not visible to us from above because of the ground snow cover, but became a new factor to be contended with in the remainder of the approach. The runway lights did not disappear from sight, although they were quite obviously dimmed because of the new obstacle.

"At this time, I was occupied relating to Bancroft (the first officer) indicated airspeed, altitude, and keeping a watch for the alignment of our flight path, which was good. I can recall calling out 125-130 knots, 400 feet, 300 feet, and then shortly thereafter to my complete surprise we made ground contact." The first officer stated that at ground contact his altimeter read 2,150 feet. The airport elevation is 1,846 feet.

There were no ground witnesses to the approach or crash which was in a large level open field. There was no moonlight and the captain testified that except for the lights on the range station, there were no ground lights seen under the approach path. Both he and the first officer testified that they did not observe the runway light appear to "spread," which amounts to a visual warning of being very low - nearly at the level of the lights upon approaching the runway. A weather observation at 2037, seven minutes after the accident was: special, clear, visibility 7 miles, temperature 26°F, dewpoint 26°F, wind south 10 knots, altimeter setting 29.80 inches (aircraft accident) (observation recorded but not transmitted via teletype).

The initial point of contact of the nosewheel was about three feet to the right of the extended centerline of runway 17 and approximately 4,061 feet short of the threshold of that runway. Additional marks indicate that the aircraft struck while nearly level longitudinally, in a yaw of about six degrees to the right, and in a shallow left bank.

Upon initial impact, the left main landing gear collapsed and was torn free. Both propellers struck the ground and were also torn off with the nose cones of their respective engines. The left wing became detached as the aircraft rolled to the left onto its back and slid, inverted, swerving to the left and coming to rest on a heading of about 045° at a distance of 1,275 feet from the place of first contact. Fire developed in the detached left wing, but not in the fuselage. Consequently all 43 occupants were able to evacuate the aircraft quickly, with the majority going out through the galley service door, which the stewardess opened and the others leaving via the emergency exit at seat 8D. The captain left through a cockpit window; the first officer and one passenger through a hole in the fuselage. Injuries were sustained by both pilots and three passengers.

Calculations based on propeller slash marks and other physical evidence indicated the left engine was developing 1390 HP at impact while the right was developing 1280 HP.

In the examination of the wreckage nothing was found to indicate any malfunctioning of the aircraft nor any of its systems, or components, including powerplants and instruments. Both pilots stated that no difficulty of any nature was experienced with the aircraft. Both altimeters were found set at 29.86 inches. These altimeters were bench-checked and both were found to be operating normally and within tolerances. The aircraft's static air system was also examined and no restriction or foreign matter was found.

The captain's scroll type checklist was found set at "cruise"; the first officer's at "descent." Company policy calls for the checklist challenge to be called by the pilot not flying (who performs those items he can reach), and the pilot who is flying responds and performs those items which must be accomplished from his position.

The first officer testified that his rate of descent was close to 500 feet per minute throughout the descent. The aircraft passed over wires 24 feet above the ground at a point 293 feet short of the crash site.

Shortly after the accident the involved navigational ground aids were checked by the Federal Aviation Agency (FAA) and found to be operating normally. The FSS procedures were found to have been routine and satisfactory.

The FAA approved approach plate for runway 17 at Grand Island indicates the landing minima to be 500 feet and one mile. However, authority for the approach of FAL 363 is contained in the FAA approved Operations Specifications[5/] for Frontier Airlines. The pertinent paragraph (27) follows:

> 27. Landing Minimums, Local Conditions - Regular Refueling, and Provisional Airports - IFR
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> Unless prohibited in the applicable Form ACA-511[6/] a landing may be made at an airport when the local visibility is reduced to not less than 1/2 mile by purely surface weather conditions such as smoke, haze, dust, ground fog, blowing snow or sand, provided the ceiling is not less than 1000 feet, the aircraft is aligned with the runway of intended landing before entering the local surface visibility conditions, and the runway of intended landing is plainly visible allowing the pilot to have adequate visual reference to the line for forward motion at all times during final approach and landing.

Analysis

The evidence shows that there was no malfunctioning of the aircraft or its components. Similarly no discrepancies were found with the operation of the ground facilities. Thus, the cause of the accident must be attributed to operational factors.

The fact that the check list scrolls were found with one at "cruise" and one at "descent" could indicate that they were not being used by the pilots or that they had been moved by impact forces or during the subsequent evacuation from the inverted fuselage.

In reference to the rate of descent it has been shown that the aircraft passed over wires 24 feet above the ground at a point 293 feet short of the crash site. This being true, at an assumed groundspeed of 115 knots the rate of descent would have been at least 712 feet per minute. The normal rate of descent is 500 feet per minute, which the first officer stated he used.

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5/ Operations Specifications are rules of particular applicability issued by the FAA Administrator.

6/ Form ACA-511, the FAA's Standard Instrument Approach Procedure for individual airports. In this instance, Grand Island, Nebraska, does not carry any such prohibition.

There is no way of establishing exactly how far the aircraft was from the VOR when the decision to commence the approach was made. However, the aircraft was north of the low frequency range, northbound, when a 90 degree left turn, then a 270 degree right turn, were made to reverse the direction of flight. At the conclusion of the latter turn the aircraft was headed toward the runway. The aircraft was probably quite close to the airport because of the high rate of descent.

During this descent the pilots did not properly monitor either their altimeters or their vertical speed indicators. When the region of lowered visibility was entered and the runway lights dimmed, the descent continued and within a very few seconds the aircraft struck the ground. They may not have seen any "spread," because the lights were no longer visible.

The Board assumes that the decision to start an approach, upon receipt of permissive weather, was made quickly and while the aircraft was very close to the airport. The ensuing rapid descent, coupled with the failure to monitor the vertical speed indicators and altimeters, actually resulted in flying into the ground after having encountered an area of restricted visibility in ground fog.

## Probable Cause

The Board determines the probable cause of this accident was failure of the crew to monitor altitude properly during a landing approach.

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

# SUPPLEMENTAL DATA

## Investigation

The Civil Aeronautics Board was notified of this accident immediately after its occurrence. An investigation was immediately initiated in accordance with the provisions of Title VII of the Federal Aviation Act of 1958, as amended. Depositions in connection with this investigation were taken at Denver, Colorado, January 18, 1963.

## The Carrier

Frontier Airlines, Inc., is a Nevada Corporation with its principal office in Denver, Colorado. The corporation holds a certificate of public convenience and necessity issued by the Civil Aeronautics Board, and an air carrier operating certificate issued by the Federal Aviation Agency. These certificates authorize the carrier to engage in air transportation of persons, cargo, and mail over the route involved.

## The Aircraft

The aircraft was a Convair model CV-340-31, serial No. 59, and bore FAA identification N73130. It was manufactured March 4, 1953, and at the time of the accident had a total operational time of 19,654 hours. Maintenance had been current and in compliance with FAA requirements.

The two engines were Pratt & Whitney model R-2800, CB-16, and the propellers were Hamilton Standard model 43E60. Maintenance of engines and propellers had been current and in compliance with FAA requirements.

## Flight Personnel

Captain Joseph L. Romano, age 43, had a total of 16,411 hours of piloting time of which 2,939 hours had been in the subject type aircraft. He was properly certificated, rated and checked. His rest period, prior to the start of the subject flight, was 16:12 hours. He had been employed by Frontier Airlines since December 1946.

First Officer Karl D. Bancroft, age 33, had a total of 4,602 piloting hours of which 1,375 had been in the subject type aircraft. He also was properly certificated, rated and checked, and had a rest period of 16:12 hours prior to starting the subject flight. He was employed by Frontier Airlines in March 1958.

Captain Romano and First Officer Bancroft had flown together, as a crew, about 65 hours.

Stewardess Patricia L. Reed, age 22, was employed by Frontier Airlines February 1962, and had completed all required training including emergency procedures.