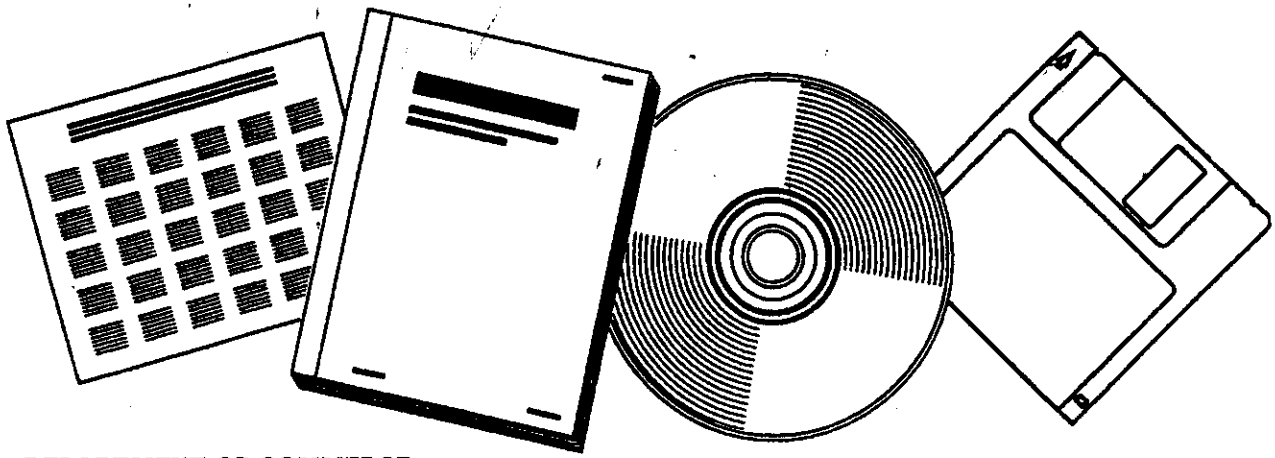
AIRCRAFT ACCIDENT REPORT. FRONTIER AIRLINES, INC. DOUGLAS DC-3C, N65276, STAPLETON INTERNATIONAL AIRPORT, DENVER, COLORADO. DECEMBER 21, 1967

NATIONAL TRANSPORTATION SAFETY BOARD,
WASHINGTON, D. C

20 MAR 1968



U.S. DEPARTMENT OF COMMERCE
National Technical Information Service

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File 1-0028

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Adopted: March 20, 1968

FRONTIER AIRLINES, INC.

DOUGLAS DC-3C, N65276, STAPLETON INTERNATIONAL AIRPORT

DENVER, COLORADO

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NATIONAL TRANSPORTATION SAFETY BOARD
DEPARTMENT OF TRANSPORTATION
WASHINGTON D.C. 20591

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SYNOPSIS

At 1600 m.s.t., December 21, 1967, Frontier Airlines cargo flight 2610, a DC-3C, N65276, crashed during takeoff from runway 35 at the Stapleton International Airport, Denver, Colorado. The captain and first officer, the only occupants of the aircraft, were killed. The aircraft was destroyed by impact and fire.

Investigation revealed that the takeoff had been made with a control batten or gust lock in place on the right elevator.

The Safety Board determines that the probable cause of this accident was the failure of the crew to perform a pre-takeoff control check resulting in takeoff with the elevators immobilized by a control batten.

1. INVESTIGATION

1.1 History of the Flight

On December 21, 1967, Frontier Airlines had a backlog of more than 100,000 pounds of air freight which they were attempting to move during the busy pre-holiday period. Because of this, employees and equipment were pressed into service in a maximum effort to move the freight. Although Frontier did not use its DC-3 equipment in all-cargo operations, the passenger seats of N65276 were removed and the DC-3C was assigned to operate as all-cargo Flight 2610, from the Stapleton International Airport at Denver, Colorado to Rapid City, South Dakota, with an en route stop at Scottsbluff, Nebraska. About 1100 m.s.t. 1/ the aircraft was moved from the company hangar to the airport freight terminal for loading.

About 1030, a Frontier radio communicator who knew how to prepare weight manifests was assigned to prepare the manifest for Flight 2610. He was given the operating and pit weight maximums for the aircraft. The dispatch office prepared a dispatch release for the flight. At 1100 and 1400 the employee called the freight office for specific loading information from which to execute the weight manifest. He was told both times that the information was not yet ready and would be furnished to him later. When this employee's shift ended at 1430 he still had not received the information. He then went off duty, neglecting to inform his relief of the status of the situation.

In the meantime N65276 was being loaded. An air cargo service employee listed the cargo before it was loaded and tied down and later totalled its

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

weight. No one engaged in the loading could recall that the cargo was placed in the aircraft according to any formal preloading schedule.

The first officer came to the air cargo office about the time the cargo listing was being totalled. He was asked if a weight manifest were needed and he replied, "No, we have our release, that's enough." When he reached the aircraft some of the loading remained to be done and he authorized the loaders to use some of the space left in the fuselage for an aisle to accommodate this cargo. The first officer boarded the aircraft, took the left pilot's seat and had started both engines by the time the captain arrived and got aboard.

Just before the flight started to taxi out and while the captain was getting settled in his seat, a Frontier station agent began to remove the control battens and landing gear pins. When he started to remove a gear pin before the pilot signaled that hydraulic pressure on the gear was up, another station agent stopped him and took over. The latter agent subsequently stated that there was no batten on the left elevator and he did not check the right one because it was customary to install the device on the left elevator when only one batten was used. He said that after he finished, he gave the crew a departure salute and that at no time did he see any of the controls move or any indication from the first officer that any of the controls were not movable.

Flight 2610, appropriately cleared, left the loading area at 1544 and about 1559 began takeoff using runway 35. Weather conditions were: scattered clouds at 5,000 feet, visibility 60 miles and the wind 270 degrees at 16 knots.

According to eyewitnesses, the takeoff appeared normal until after the aircraft became airborne. At this time it entered an increasingly steep climb attitude to an estimated deck angle of 50 to 60 degrees. About 300 feet above the surface, the aircraft rolled to its left and entered a steep nose-down left turning descent and crashed off the left side of the runway. 2/ The aircraft burst into flames at impact.

1.2 Injuries to Persons

The captain and first officer were the only occupants of the aircraft and both received fatal injuries. Post-mortem pathological and toxicological examinations of the pilots revealed no indication of a human factor involvement in the accident.

1.3 Damage to Aircraft

Destroyed by impact and fire.

1.4 Other Damage

None.

1.5 Crew Information

The captain and first officer were certificated and qualified for the flight. See Appendix A for detailed crew information.

1.6 Aircraft Information

N65276 was a DC-3C. Aircraft records reflected no discrepancies affecting mechanical or structural airworthiness of the aircraft. For additional aircraft information see Appendix A.

2/ The geographical location is Latitude N39°-45' - Longitude W104°-53'

The passenger seats had been removed from the cabin of the aircraft. Frontier Airlines FAA (Federal Aviation Administration) operating specifications did not provide for the carriage of cargo in the cabin area of DC-3 aircraft with the passenger seats removed.

In the absence of a weight manifest prepared for Flight 2610, a reconstruction of the cargo loading and a weight and balance computation were made as part of the investigation. This showed that the gross weight of the aircraft at takeoff was approximately 26,123 pounds or about 777 pounds in excess of the certificated maximum allowable gross takeoff weight of 25,346 pounds. It also indicated the aft center of gravity (c.g.) limitation may have been exceeded by 1-1/2 inches. The gross weight calculation was considered accurate because cargo weights were available from waybills. The c.g. calculation, however, was only an approximation because determination of the locations of the numerous pieces of cargo put in the cabin depended entirely on the recollection of the loaders. At best, their recollections were not sufficiently precise for this purpose.

A review of the Frontier dispatch release and flight plan for Flight 2610 showed both failed to reflect the stop at Scottsbluff, Nebraska. Had this stop been included the scheduled crew duty time would have exceeded the regulatory limit by about 28 minutes.

1.7 Meteorological Information

Weather conditions were not involved.

1.8 Aids to Navigation

Not involved.

1.9 Communications

There were no communications difficulties, however, communication records showed that the crew of Flight 2610 referred to the flight as 2606 and 2607 before using the correct numerical identification.

1.10 Aerodrome and Ground Facilities

Stapleton International Airport has an elevation of 5,331 feet m.s.l. Runway 35 is 11,000 feet long and 150 feet wide, and of concrete construction.

1.11 Flight Recorders

Recorders were not installed nor were they required.

1.12 Wreckage

The aircraft struck the ground about 875 feet to the left of the centerline of runway 35 measured from a point 5,600 feet from the approach end. On impact, it was in a nose-down, left-wing-low attitude on a south-westerly heading.

During the wreckage examination, a control batten was found in the installed position on the right elevator. The elevator trim tab index on the control pedestal showed 12 degrees nose-down or the full nose-down trim position and the elevator trim tabs were found in the corresponding position. The rudder trim was deflected left or nose-right nearly its full travel and the cockpit aileron trim indicator showed 4 degrees right-wing-up.

Examination of the wreckage revealed no evidence of a mechanical or structural malfunction or failure of the aircraft prior to impact.

1.13 Fire

Fire occurred on impact and consumed major portions of the aircraft.

1.14 Survival Aspects

The accident was nonsurvivable.

1.15 Tests and Research

Research was conducted to determine the effect of the over gross weight and the possible aft-of-limit c.g. conditions on the controllability of the aircraft. This showed that neither condition, nor the conditions in combination would make the aircraft uncontrollable.

1.16 Other Pertinent Information

A review of the Frontier pilot checklist for the DC-3 showed that a check for freedom of controls should be made once after starting engines and again before takeoff. Ground service instructions call for control battens to be installed and removed by ground service personnel.

Investigation revealed that at the time of the accident Frontier did not use streamers or any other device on the battens to attract attention to them.

2. ANALYSIS AND CONCLUSIONS

2.1 Analysis

From its investigation of this accident the Safety Board concludes that the kind of environment which existed within the flight operations of Frontier Airlines during the planning and preparation for Flight 2610 was one which might well be expected to culminate in a serious incident of some kind. Faced with more than 100,000 pounds of backlog of air freight to be moved in the busy holiday period, the airline pressed its personnel and equipment into a maximum effort. In the effort, personnel, such as the

radio communicator, were assigned duties completely outside their regular areas of responsibility, shortcuts were taken and established operating procedures were disregarded. The result was an operational breakdown characterized by a lack of supervision, coordination, and communication between personnel and departments involved in the flight preparation, loading and dispatching of the flight. In fact, a DC-3 was used in straight cargo service for which the required operating specifications were not available. The result of this and the other factors was that the aircraft was loaded without any preloading plan and no weight manifest was prepared. Moreover, the flight release and flight plan which were prepared were inaccurate in that they failed to include the planned stop at Scottsbluff, Nebraska.

Despite the obvious shortcomings in the ground preparations of the flight, none of the discrepancies in loading, the overgross weight and the possible aft-of-limit c.g. conditions, or the failure of the station agent to remove the batten from the right elevator, made the accident inevitable. Rather, it was the failure of the pilots to perform the basic safety function of checking for freedom of controls that prevented detection of the locked elevators. It would appear, therefore, that the same deviation from established procedures that characterized the ground personnel's preparation for the flight was exhibited by the pilots.

It is evident that the direct and immediate cause of this accident was a failure of pilots to perform a basic safety of flight check item on the pilot checklist. It is equally evident that there were indirect and underlying

causal factors which were numerous and broad in scope. They existed in the operating system, organization, coordination and supervision of Frontier. The accident was therefore equally indicative of a weak operating system.

The Safety Board concludes that the increased surveillance activity 3/ by the FAA over the airline prior to the accident shows the FAA's awareness of the unfavorable aspects of the carriers overall operating situation, and of affirmative actions by the FAA to assist in correcting them. At the same-time, however, it is equally evident from all the circumstances surrounding the accident that this surveillance was not effective.

The elevator and rudder trim tab positions as found in the aircraft wreckage are indicators of the sequence of events in the accident. As soon as the aircraft became airborne and increased speed, it entered an increasingly steep climb. The crew must have attempted to counter this action with an application of nose-down trim. However, with the elevators locked by the batten, the elevator tabs themselves acted as elevators. Deflected upward for nose-down trim, instead of alleviating the nose-up situation they only aggravated it. The position of right rudder trim suggests an attempt by the crew to stop the aircraft from rolling to the left as it went out of control and entered its final descent.

2.2 Conclusions

(a) Findings

1. The pilots were properly certificated and qualified for the flight.

3/ See Corrective Measures, Page 11.

2. The aircraft was airworthy but loaded improperly as to weight and possibly c.g.

3. The improper loading resulted from misassignment of personnel, deviations from established procedures and a lack of supervision and coordination of personnel.

4. The aircraft was assigned to a straight cargo flight although Frontier Airlines FAA operating specifications did not provide for the carriage of cargo in the cabin of DC-3 aircraft with the passenger seats removed.

5. The aircraft was dispatched without a weight manifest and the dispatch release and company flight plan were inaccurate.

6. The station agent failed to detect and remove a control batten installed on the right elevator.

7. The control batten on the right elevator immobilized the elevators.

8. The pilots failed to perform a check for freedom of controls before taxi and before takeoff as required by the pilot checklist.

9. The shortcomings noted in paragraphs 2 through 8 were intimately associated with the changeover involved in the merger of Central Airlines into Frontier.

10. FAA surveillance of the airline was not fully adequate.

(b) Probable Cause

The Safety Board determines that the probable cause of this accident was the failure of the crew to perform a pre-takeoff control check resulting in takeoff with the elevators immobilized by a control batten.

3. CORRECTIVE MEASURES

Very early in the investigation of this accident Safety Board investigators and FAA and Frontier personnel discussed immediate measures to prevent recurrence of a similar accident.

It was clear that close attention should be given to the necessity for strict adherence to established procedures by flight and ground personnel. Accordingly a company bulletin was issued re-emphasizing the company manual requirements for weight and balance computations, preparation of load manifests and cargo loading. Another bulletin was issued to pilots stressing company manual requirements for the use of cockpit checklists, that both pilots be seated in the pilot compartment prior to engine start and that a load manifest be on board before the origination of a flight. Ground training courses were initiated for all class A station managers with planned recurrent training courses in the future for these personnel.

It was apparent that a substantial number of the breakdowns and shortcomings in personnel supervision, coordination and communications indicated by the accident were associated with the improper attempt to use the DC-3 in a one-time, all-cargo operation. In this regard Frontier Airlines gave complete assurance that no cargo flights carrying floor-loaded bulk cargo would be made until adequate procedures were developed and approved, and incorporated in their operating specifications.

Some of the weaknesses which the accident highlighted were recognized by Frontier personnel and by FAA air carrier personnel prior to the accident. They associated many of them with the rapid growth of the company and general merger problems attending Frontier's merger with Central Airlines. Accordingly, two vice-president positions were established on the executive staff of the company to strengthen its managerial capacity and capability. Both selections were men of proven reputations in airline management, one in the training and operational areas and the other in the administrative field. They assumed their duties after the accident.

In addition to its contributions to bringing about the actions described above, the FAA had begun an increased surveillance of the airline on December 1, 1967. This encompassed an increased frequency of en route inspections, a closer monitoring of training, and an increased surveillance of maintenance. After the accident, the responsible FAA district office requested assistance in its surveillance and inspection efforts from the FAA region and a Systemsworthiness Analysis Program (SWAP) team was provided on or about January 8, 1968. The activities of this team were expected to continue until about March 1, 1968.

4. RECOMMENDATION

The Safety Board concludes that some of the weaknesses in the airlines' operating system which contributed to the accident environment were, in part, the result of a lack of management capability and depth to meet the general problems associated with the airlines' current merger. These problems, in addition to the demands due to rapid growth, spread management too thin for the overall requirements imposed upon it.

In consideration of currently proposed mergers* and the overall rapid growth of the airline industry today, the Board views this accident as most significant to accident prevention for those airlines in the same or similar situations. The accident stresses the necessity for such airlines to be prepared to meet the increased demands of these situations to assure that safety is not compromised. The Board further concludes that it is encumbent upon the FAA to look upon the changeover inherent in such mergers as calling for its most affirmative and complete surveillance efforts.

BY THE NATIONAL TRANSPORTATION SAFETY BOARD:

/s/ JOSEPH J. O'CONNELL, JR.
Chairman

/s/ OSCAR M. LAUREL
Member

/s/ JOHN H. REED
Member

/s/ FRANCIS H. McADAMS
Member

Louis M. Thayer, Member, did not take part in the adoption of this report.

*A merger between Pacific Airlines, West Coast Airlines and Bonanza Airlines, and one between Allegheny Airlines and Lake Central Airlines, are presently before the Civil Aeronautics Board for approval, and if either or both are to be consummated it will be in the near future.

APPENDIX A

1.5 Crew Information

Captain F. A. Crane, age 34, held airline transport pilot certificate No. 331863 with DC-3 and CV-580 aircraft ratings. He completed his last proficiency check satisfactorily on September 7, 1967, and his last line check on September 26, 1967. He held a currently valid first-class medical certificate with no limitations issued on September 8, 1967.

Captain Crane had flown a total of 13,011 hours of which 4,860 were in DC-3 aircraft and of which 49 were in the DC-3 during the 90 days preceding the accident. His off-duty time was 12 hours prior to Flight 2610. His on-duty time for the 24-hour period was 6 hours and 19 minutes.

First Officer R. L. Cochran, age 33, held commercial pilot certificate No. 1436378 with airplane single and multiengine land and instrument ratings. He completed his last proficiency check satisfactorily on February 17, 1967. He held a currently valid second-class medical certificate with no limitations issued on January 5, 1967.

First Officer Cochran had flown a total of 3,141 hours of which 937 were in the DC-3 and of which 6 were in the DC-3 during the 90 days preceding the accident. His off-duty time was 12 hours prior to Flight 2610. His on-duty time for the 24-hour period was 6 hours and 19 minutes.

1.6 Aircraft Information

N65276 was manufactured December 2, 1943, with serial No. 19202. The aircraft had accumulated 49,282 flight hours at the time of the accident.

It had been operated 158 hours since its last line maintenance and 3,308 hours since major overhaul.

The aircraft was equipped with two Pratt and Whitney R1830-92 engines. The left engine, serial No. 322681, had accumulated 23,339 hours of which 699 were since major overhaul. The right engine, serial No. 359571, had accumulated 31,408 hours of which 372 were since major overhaul.

The engines were equipped with Hamilton-Standard 23E50 propellers. The left propeller, serial No. RRA-834 had accumulated 13,559 hours of which 1,008 were since overhaul. The right propeller, serial No. NK-146778 had accumulated 6,349 hours of which 372 were since overhaul.

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