

No. 17

Canadian Pacific Air Lines, Inc., Bristol Britannia 314, CF-CZB accident at Honolulu International Airport, Honolulu, Hawaii on 22 July 1962. Civil Aeronautics Board (U. S. A.) Aircraft Accident Report File No. 1-0011, released 13 August 1963.

1. Historical1.1 Circumstances

The aircraft had arrived in Honolulu at 0507 hours Hawaiian standard time on 21 July as CPA Flight 323 from Vancouver, British Columbia, Canada. It was departing, the evening of 22 July, as Empress Flight 301 on a scheduled international flight for Nandi (Fiji Islands), Auckland (New Zealand) and Sydney (Australia). The night take-off was commenced at 2238 hours local time\* and approximately two minutes after becoming airborne and during the climbout a fire warning indication for No. 1 engine was received in the cockpit. The No. 1 propeller was feathered and the tower controller was advised that the aircraft was returning to Honolulu. As an over-gross landing weight condition existed, fuel jettisoning in the amount of 35 000 lb was carried out. The jettisoning operation was completed at 2306 hours following which the flight was vectored west of the outer marker to intercept the ILS final approach course for Runway 8. The three-engine landing approach appeared normal until the aircraft had proceeded beyond the runway threshold and had commenced its landing flare at an altitude of approximately 20 ft above the runway centreline. A go-around was attempted from this position, and the aircraft banked and veered sharply to the left. Initial ground contact was made by the left wing tip approximately 550 ft to the left of the runway centreline and approximately 1 700 ft beyond the threshold of the runway. The aircraft progressively disintegrated as it moved across the ground, then struck heavy earth-moving equipment parked approximately 970 ft from the runway centreline. The accident occurred at 2319 hours.

1.2 Damage to aircraft

Except for the rear portion of the fuselage and attached tail section, the aircraft was destroyed by impact and fire.

1.3 Injuries to persons

The aircraft was carrying a crew of 11 and 29 passengers at the time of the accident. The 7 flight crew and 20 of the passengers sustained fatal injuries. The 13 survivors received varying degrees of crash injuries and burns.

2. Facts ascertained by the Inquiry2.1 Aircraft information

The only aircraft maintenance required while in Honolulu was the replacement of the No. 4 inverter. There were no carryover items, and no discrepancies were entered on the pre-flight inspection form.

\* Hawaiian standard time

Following the completion of the fuel jettisoning operation the aircraft was in flight for approximately 13 minutes before the accident occurred. It was assumed that during this time the crew had sufficient opportunity to ensure that the remaining fuel load was symmetrically distributed and that the aircraft trim was set accordingly.

The gross landing weight of the aircraft at the time of the attempted landing was estimated at 134 005 lb. This was computed by subtracting both the 35 000 lb of jettisoned fuel and the 5 000 lb of fuel estimated to have been consumed in flight from the recomputed ramp gross weight of 174 005 lb. The maximum allowable three-engine gross landing weight is 135 000 lb. At the estimated landing weight the centre of gravity during approach would have been 18.2 percent MAC (Mean Aerodynamic Chord) which is within the approved aircraft landing limits.

## 2.2 Crew information

The pilot-in-command, age 45, held a valid Canadian airline transport certificate with a Britannia aircraft endorsement. He had a total of 13 250 flying hours of which 920 hours were in Britannia aircraft. In addition to his training flights he had, as captain, performed two previous three-engine landings in the Britannia under actual conditions. This was his first check over this route on Britannia aircraft.

The check pilot on this flight, age 44, also held a valid Canadian airline transport certificate with a Britannia aircraft endorsement. He had flown a total of 16 073 hours including 1 628 hours on Britannias. He had signed the flight clearance for this flight.

The two first officers, aged 33 and 30 years, held valid certificates with Britannia aircraft endorsement. Each had flown close to 5 700 hours including approximately 1 500 on Britannia aircraft.

The second officer, age 28, also held a valid airline transport rating with a Britannia endorsement and had flown 4 234 hours of which 956 were on Britannias.

The two navigators, aged 34 and 35 years, held valid Canadian flight navigator certificates.

The other crew members aboard were a purser and three stewardesses.

All crew members had 34:30 hours rest prior to this flight.

## 2.3 Weather information

Not considered significant. Visibility was good and the aircraft was below all cloud.

## 2.4 Navigational Aids

The flight was vectored to intercept the ILS for final approach to runway 08. The captain checked his position on passing the outer marker on final descent.

## 2.5 Communications

No difficulties were experienced in the air-ground communications. The final transmission from the flight was about 50 seconds prior to impact.

## 2.6 Aerodrome Installations

Runway 8 is 12 380 ft and 200 ft wide and has a U. S. standard configuration "A" approach lighting system with sequenced flashing (strobe) lights. This system includes a row of green threshold lights and white, high-intensity runway lights. All lights, with the exception of the strobes, were on and operating throughout the approach of CF-CZB.

## 2.7 Fire

There was no evidence of fire prior to initial impact. The fire and rescue crew proceeded to the crash scene immediately and succeeded in keeping the fire from the rear portion of the fuselage but were unable to extinguish the fire which had completely engulfed the main section of the aircraft.

The investigation revealed no evidence of an actual fire in the No. 1 engine. Furthermore, there was no evidence to indicate that any fire extinguishing agent had been discharged.

## 2.8 Wreckage

Four earth-moving vehicles in the 10 to 22 ton weight class were parked approximately 850 ft to the north of, and parallel to runway 8. This equipment was being utilized in the construction of a jet taxiway which is parallel to and 750 ft from the runway. Three of these vehicles formed a partial barricade to the progress of the disintegrating aircraft and confined the main portion of the wreckage in this area.

## 3. Comments, findings and recommendations

### 3.1 Discussion of the evidence and conclusions

No flight recorder was installed nor was one required on the aircraft.

All three landing gear assemblies were recovered and although the impact and fire damage was severe, it was determined that they were in the up or nearly up position at impact.

All eight flap screwjacks were found in the fully extended position corresponding to a 45-degree flap setting.

Control surface positions at impact could not be determined because of the extensive damage to the flight control system from impact and fire. However, there was no evidence to indicate a flight control or structural failure prior to impact.

All four engines and propeller assemblies separated from the aircraft during its disintegration and were recovered in the wreckage area. It was determined that the No. 1 propeller was in the fully feathered position and that the engine was not operating at the time of impact. Inspection of powerplants Nos. 2, 3 and 4 indicated that they were operating at impact and their propellers were at approximate blade angles of 25 degrees. The flight low pitch (flight fine) stop is 22 degrees.

No evidence was found in any of the powerplants, including No. 1, that would indicate a failure or malfunction prior to impact.

From the probable approach flight path, based on observations of survivors and witnesses, in conjunction with the wreckage distribution pattern, it was determined that the go-around was initiated at a point approximately 600 ft beyond the runway threshold and at an altitude of between 20 and 40 ft above the runway centreline. This was further substantiated by the fact that the landing gear was observed in the extended position as the aircraft crossed over the runway threshold but was found in the retracted position in the wreckage area. The average landing gear retraction time for the Britannia is 8-1/2 seconds. Thus, using a target threshold speed of 115 kt it would require 8 seconds to cover the distance of 1 600 ft from the go-around initiation point to the general wreckage area. The minimum threshold speed of 115 kt used in this computation is undoubtedly high considering that the pilot had most likely reduced power below that necessary for approach and was in the process of flaring the aircraft prior to initiating the go-around. However, it does sustain the conclusion that the landing gear retract position had been selected at the initiation of the go-around and that sufficient time was available to attain retraction prior to impact.

The Board was unable to determine the reason why a go-around was attempted at so late a stage in the approach and with the aircraft in the full landing configuration. There was no evidence that a go-around was required to avoid any obstacles, vehicles or pedestrians that may have been on the runway.

The possibility of a fuel imbalance condition resulting from a fuel jettison system malfunction was presented for consideration by the Board. It was theorized that a fuel jettison valve on the right wing did not close following the fuel jettisoning operation resulting in an asymmetrical fuel loading condition. It was stated that this condition presented a control problem at flareout which necessitated a go-around. The Board thoroughly reviewed this report and concluded that the effects of fuel imbalance resulting from the described system failure would not have resulted in the sequence of events that were evidenced in the investigation of this accident. Another possible reason considered for the go-around was the receipt of an unsafe landing gear warning horn and/or light in the cockpit when the throttles were retarded. However, no physical evidence was found to substantiate this possibility.

From all the evidence available, the Board concluded that a go-around was attempted shortly after the aircraft had crossed the runway threshold and while it was still in a full landing configuration. The abruptness of the aircraft's veering from the runway, in conjunction with the evidence of a shallow angle of bank at impact, confines the responsible factors necessary for this manoeuvre to those which would produce a condition of asymmetry about its vertical axis. It can be assumed that an airspeed of 115 kt (target threshold speed) or above was maintained until the aircraft crossed over the threshold. From this point and until the go-around was initiated, engine power was reduced and the aircraft was flared in preparation for landing thus decreasing the airspeed to or below  $V_{mcl}^*$  (minimum control speed at landing). Because the aircraft was

\*  $V_{mcl}^*$  in the landing configuration with 45° flap setting is 100 kt. Subsequent tests carried out under similar conditions confirmed the improbability of being able to maintain directional control below this speed.

operating at a speed below  $V_{mcl}$ , it could not have responded to the application of primary flight control so as to accomplish the described manoeuvre. The existence of a split-flap condition was ruled out by the position of the flap jackscrews which evidenced a symmetrical full down flap configuration. However, an asymmetric thrust condition could have produced the necessary yawing moment the manoeuvre required. The Board believed that this condition was developed by the sudden application of take-off power on the three operating engines.

### 3.2 Probable cause

The probable cause of this accident was the attempted three-engine go-around, when the aircraft was in a full landing configuration, at insufficient airspeed and altitude to maintain control.

### 3.3 Recommendations

No recommendations are contained in the report.

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