No. 23

West Coast Airlines Incorporated, Fairchild F-27, N 2707, accident at Calgary Airport, Alberta, Canada, on 24 August 1963. Report No. F-314, released by the Department of Transport, Canada.

1. Investigation

1.1 History of the flight

West Coast Airlines Flight 794 left Spokane, Washington, (USA), at 2238 hours mountain standard time on 24 August 1963 on a scheduled international flight to Calgary, Alberta. The route flown was Spokane direct to Cranbrook, British Columbia, thence via Blue 3 to Calgary. At 2333 hours Flight 794 reported to Calgary Terminal Control at 17 000 ft. The flight was then cleared to the Calgary VOR station at 13 000 ft and requested to report by the Dyson Intersection. This was acknowledged and on request the latest Calgary weather was provided to the flight together with the altimeter setting (30.07 in.Hg) and the runway to be used (28). Flight 794 reported by Dyson at 2338 and was cleared to maintain 10 000 ft. They were offered and accepted radar vectors to the localizer serving runway 28 and were then cleared for an approach. The flight was given a vector of 040° and advised it was south of the VOR station. At 2346 hours the flight was advised it was 14 miles south of the localizer. Following successive vectors of 350° and 310° the flight was advised at 2351 hours it was 1-1/2 miles south of the localizer and clearance was issued for a straight-in approach on interception of the localizer. Thirty-three seconds later the flight was informed it was 2 miles from the outer marker intersection and then at 2352 hours that it was over the outer marker intersection at which time it was requested to call the control tower. The flight called the control tower and reported over the intersection following which it was cleared to land on runway 28 and provided with wind information. An acknowledgement of this at 2352 hours was the last transmission from the aircraft. It was determined subsequently that the aircraft struck the ground about 8 000 ft before the threshold of runway 28 and 420 ft to the right of the centre line of that runway. It slid for a distance of about 800 ft before coming to rest. At the time of impact (2355 hours) the aircraft was approximately in a 5° nose-down attitude.

1.2 Injuries to persons

Injuries	Crew	Passengers	Others
Fatal			
Non-Fatal	2	2	
None	1	10	

1.3 Damage to aircraft

The aircraft was destroyed.

1.4 Other damage

No other damage was reported.

1.5 Crew information

The pilot-in-command held a United States airline transport pilot's licence with an instrument rating and had accumulated a total of 19 687 hours flying experience. He had a total of 3 219 hours on F-27 aircraft, including 153 hours in the 90 days prior to the accident. He had flown the route 19 times of which 5 flights terminated at night. This included 8 flights into Calgary since January 1963, one of which was at night. His night flying experience was 3 309 hours, his actual instrument experience 2 689 hours and his simulated instrument experience 550 hours.

The co-pilot held a United States commercial pilot's licence with an instrument rating and had accumulated a total of 4 230 hours flying experience. He had a total of 488 hours on F-27 aircraft including 169 hours in the 90 days prior to the accident. His night flying experience was 630 hours and his actual and simulated instrument flying experience was 465 hours.

1.6 Aircraft information

A United States Certificate of Airworthiness had been issued for this aircraft. It was established that the aircraft had been properly maintained and there were no faults likely to have contributed to the accident.

The weight (32 106 lb) and centre of gravity of the aircraft were calculated to be well within the allowable limits at the time of the accident.

The type of fuel was not specified in the report.

1.7 Meteorological information

The weather at Calgary Airport was reported to have been broken cloud at 1 400 ft, scattered cloud at 600 ft, visibility 15 miles, temperature 48°F, dewpoint 47°F, and the wind from the north-northwest at 15 mph. The crews of two aircraft which landed 1 hour before and 30 minutes after the accident respectively reported the ceiling at 400 to 500 ft above ground with some scattered clouds around 300 ft. The subject flight was clear of cloud between 4 200 and 4 300 ft, which is about 650 to 750 ft above ground.

1.8 Aids to navigation

The instrument approach system for runway 28 consists of a localizer on 109.5 Mc/s. There is no glide path. The outer marker is formed by the intersection of the localizer and either the 172° radial of the Calgary VOR, the southeast leg of the Calgary low frequency range, or a 039° magnetic bearing from the Alpha beacon (now called Yankee beacon). The outer marker intersection is 4.8 NM from the threshold of runway 28. All available radio aids were operating and serviceable before and after the accident.

1.9 Communications

No difficulty in communications was reported.

1.10 Aerodrome and ground facilities

Runway 28 at Calgary Airport is 8 000 ft long by 200 ft wide, and the threshold elevation is 3 542 ft ASL. The runway lights are a clear, variable, medium intensity system. There are 5 green threshold lights on either side of the threshold. The approach lights are a low intensity system consisting of double-unit yellow 100 W lamps. The poles are 200 ft apart and extend 3 000 ft east of the threshold. All lights were on and serviceable at the time of the accident.

1.11 Flight recorders

A flight recorder was carried and was operating during the flight. The acceleration parameter was not recorded due to a defective diamond on the stylus. The recorder was functioning normally in respect to the other parameters. The readout of the flight recorder tape was as follows:

a) Altitude - There was nothing significant in the altitude until the flight reached the outer marker intersection. The aircraft crossed the outer marker intersection at slightly over 4 900 ft and entered a continuous descent until ground impact at an altitude of about 3 575 ft just under 2 minutes later. This gave an average rate of descent of about 650 ft/min.

b) Indicated airspeed - The indicated airspeed over the outer marker intersection was 111 kt and varied between 111 kt and 106 kt until about 15 seconds before impact. During the last 15 seconds of flight the airspeed decreased from 106 kt to 88 kt at impact.

c) Magnetic Heading - The aircraft crossed the outer marker intersection on a heading of 305°. Twenty-seven seconds later the heading was 269°; after a further 25 seconds the heading was 282°; 54 seconds later it was 294° and at impact a further 10 seconds later it was 281°. The average heading between 305° and 269° is 287°. The aircraft was flown 18° either side of the average heading between the outer marker intersection and the impact point.

1.12 Wreckage

The wreckage trail extended for 800 ft from first impact on an average heading of 277° magnetic. Parts were shed from the aircraft until the fuselage minus undercarriage, wings and tail unit came to rest on a heading of 346° magnetic.

1.13 Fire

No fire was reported.

1.14 Survival aspects

Survival aspects were not mentioned in the report.

1.15 Tests and research

The pitot static system was subjected to exhaustive tests in view of the nature of the accident. There were certain leaks in the system, some of which were probably a result of impact forces. In any case it is not considered they would have contributed to the accident.

2. Analysis and Conclusions

2.1 Analysis

The elevation of the threshold of runway 28 at Calgary Airport is 3 542 ft above sea level. The co-pilot stated that after passing the outer marker intersection the aircraft was flown through the localizer and then back on. He did not recall any difficulty in getting established on the localizer. The pilot-in-command stated that only small corrections in heading were made after passing the outer marker intersection. The co-pilot stated that when the aircraft reached 4 500 ft he read altitudes for every 100 ft descent. He first indicated they broke out of cloud at 4 200 ft but later revised this to say that he observed the runway at 4 200 ft and so informed the pilot-in-command. He called out "approaching minimum" between 4 200 and 4 100 ft. He considered the aircraft was low when he observed the runway from 4 200 ft, but after observing the 4 000 ft altitude he was occupied with other matters and did not follow the descent by instruments or by looking outside. The pilot-in-command reported he remained on instruments until the co-pilot reported the runway was in sight at which time his altimeter indicated about 4 200 ft. He then looked out and found the aircraft was out of the clouds and he could clearly see the runway lights. He noted the runway was still some distance ahead and considered he would have to close the distance before continuing the let down. He then returned to instrument flying. He stated that he remembered applying power, however, during subsequent questioning, he indicated that he remembered that he wanted to add sufficient power to maintain altitude and was in the process of doing so when the aircraft struck the ground. He was not aware of how much power he had succeeded in applying. The co-pilot first reported that between 4 200 and 4 100 ft the pilot-in-command began to add power but later changed this to say that the pilot-in-command had his hand on the throttles, but he did not recall hearing any rpm increase prior to impact. The pilot-in-command stated that at the time of impact his altimeter indicated a height of just under 4 000 ft and not less than 3 957 ft, and the co-pilot stated that after the aircraft was on the ground both altimeters indicated the terrain elevation. Technical examination established little power was being developed on impact. From the evidence of the flight recorder in respect to indicated airspeed and altitude it is considered unlikely there were any power changes between the outer marker intersection and the impact point.

2.2 Conclusions

Findings

The crew were properly licensed and were suitably experienced for the flight.

The aircraft was airworthy and intact prior to impact. The weight and centre of gravity of the aircraft were calculated to be well within the allowable limits at the time of the accident.

The weather was above the approved minima.

The operation of the airport and associated facilities was normal.

Other aircraft approached and landed on this runway before and after the accident without difficulty and did not report any weather phenomenon.

The aircraft descended under low power with a rate of descent of 650 ft/min from the outer marker to the impact point.

The aircraft was manoeuvred in excessively large heading changes between the outer marker intersection and the impact point.

A loss of airspeed occurred during the final 15 seconds of flight.

The co-pilot did not monitor the final stages of approach visually or by reference to his instruments.

Cause or
Probable cause(s)

The pilot-in-command failed to maintain the approved minimum altitude on approach.

Failure of the co-pilot to monitor the final stages of the approach is considered to be a contributing factor.

3. Recommendations

No recommendations were made in the report.

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