No. 10

Aerolineas Argentinas, Caravelle SE-210-VI-N, LV-HGY, accident at Pajas Blancas Airport, Cordoba Province, Argentina on 3 July 1963. Accident Report No. 1905, published in Information Bulletin No. 11 (Aircraft Accidents), September 1965, by the National Directorate of Civil Aviation, Argentina.

1. Investigation

1.1 History of the flight

Flight AR-527/03 was a scheduled domestic flight from Mendoza to Buenos Aires Aeroparque, Argentina, via Pajas Blancas Airport in Cordoba Province. The flight plan for the trip was prepared in Mendoza by the airline's dispatcher and was approved by the chief of the Operations Office as well as by the Northwest Regional Control Area. The aircraft was cleared to fly at 8 700 m with reporting points along the airway at Chañar-Pampa Salinas and at the entrance to the Terminal Area. The aircraft took off from Mendoza at 1750 hours with 63 passengers and 7 crew members and made its first contact by radio with Pajas Blancas Airport control tower at 1840 hours. Six minutes later it was cleared for an instrument approach to runway 17. The approach was initiated at a height of 1 500 m which was contrary to the regulation height of 3 300 m prescribed for jet aircraft. A magnetic heading of 40° was flown on the outbound track and the aircraft was above the cloud layer at a height of 1 054 m above the ground. After the time prescribed in the airline's approach chart had elapsed, a left-hand turn was initiated, to intercept QDM 200°. During the turn the height was maintained with landing gear extended, flaps at 20° and an indicated airspeed of 140 kt. On completion of the turn a magnetic heading of 200° was flown towards the beacon, and the aircraft resumed its descent until intercepting VOR radial 168. At this point the pilot thought he was 250 m above the ground and, still flying on instruments, he intercepted the VOR and changed course to 170°. When he did not make visual contact with the runway at a height of 150 m he started a go-around, climbing on a magnetic heading of 105°. He then initiated a right-hand turn to intercept the radio beacon again and asked for another clearance from the tower to come in again.

He flew over the beacon at a height of 1 050 m, then followed a magnetic heading of 40° during about 2 min 30 sec and, while still descending, initiated a left-hand turn until he obtained QDM 200. The landing gear was extended and locked, flap setting 20°, and a normal descent at 500 ft/min. was maintained. He intercepted VOR radial 168, announced that he was at 160 m and then initiated a turn to align himself with runway 17. Shortly thereafter the aircraft's port wing struck some trees five meters high and the port landing gear came into contact with the ground. The pilot-in-command reduced power and pushed the control column forward. After having travelled during approximately 60 m on its port landing gear, the aircraft rolled on its whole undercarriage another 700 m.

At 390 m from initial impact the port wing struck some other trees, the fuel tanks bursted out and fire broke out. The aircraft then came into contact with the General Belgrano Railway tracks, broke its undercarriage, tearing away 25 m of railway rails and finally came to rest 280 m before the threshold of runway 17 (See Figure 10). The accident occurred at 1906 hours.

1.2 Injuries to persons

Injuries	Crew	Passengers	Others
Fatal			
Non fatal			
None	7	63	

1.3 Damage to aircraft

The aircraft was destroyed by impact and subsequent fire.

1.4 Other damage

The aircraft struck two posts and the rails of the General Belgrano Railway, tearing them up over a distance of 25 m. Also, the rudder severed some telegraph wires and finally demolished some wire fencing.

1.5 Crew information

The pilot-in-command held a valid senior commercial pilot's licence and was satisfactorily certificated. His total flying experience amounted to 16 835 hours. He had flown a total of 15 139 hours with the subject airline including 5 109 hours at night and 1 313 hours on instruments. His experience on Caravelle aircraft amounted to 513 hours of which 70 hours were flown at night. During the 90 days prior to the accident he had flown 118 hours on the Caravelle - 11 hours during the preceding 30 days - and 3 hours on the day of the accident.

No information was included in the report regarding the other crew members on the subject flight.

1.6 Aircraft information

The aircraft's Certificate of Airworthiness was valid until 14 June. The aircraft had been satisfactorily maintained and operated within the specified limits.

No mention was made in the report of the aircraft's weight and centre of gravity.

JP.1 fuel was being used on the subject flight.

1.7 Meteorological information

The forecast based on the 0900 hours weather chart was as follows:

Mendoza-La Rioja:

overcast; visibility 12 km; clouds: 6/8 to 8/8 Sc and St at 300-600 m, 7/8 Sc at 1200 m, 6/8 Ac and As at 2500 m; winds: 320°/40 kt at 7 000 m and 310°/50 kt at 9000 m.

This forecast which was nearly 9 hours old at the time of take-off, was approved by the dispatcher and the pilot-in-command. It was established that neither the dispatcher nor any of the flight crew member went to the meteorological office to discuss the weather situation and to request the latest information based on the 1500 hour chart. As the weather forecast for the Mendoza and Cordoba area remained the same until 2100 hours, it was concluded that this did not have any bearing on the accident, however it revealed negligence in the preparation of the flight. After the missed approach procedure was initiated the airline operations passed the following weather information to the aircraft: ceiling 150 m, visibility 12 km - decreasing and at 1855 the tower, on request, reported: estimated ceiling 300 m and estimated visibility 6 km. Finally at 1904 the aircraft was informed by the tower that the ceiling had lowered down to 150 m according to the MET office.

The accident occurred at night.

1.8 Aids to navigation

A radio beacon (CBA) and a VCR were available and functioning at Pajas Blancas Airport.

1.9 Communications

Communications were normal and were tape recorded by ATC.

1.10 Aerodrome and ground facilities

Runway 17-35 had electric lights on both sides and kerosene flares at both ends. All were in operation at the time of the accident as well as the aerodrome rotating beacon and identifier.

1.11 Flight recorders

The aircraft, at the time of the accident carried a Waste-King flight recorder, recording five parameters: time, height, speed, heading and acceleration. It had been inspected at the factory on 26 March 1962, was returned on 25 May and had then been installed in the subject aircraft on 12 June 1963.

For reasons which could not be established, headings were not being recorded. The cleaning of the tape by the airline to remove the effects of the fire made it impossible to obtain a clear interpretation of what had been recorded. It was sent to the Civil Aeronautics Board (U.S.A.) where despite varied laboratory treatment including x-ray, photographing and amplification by high-powered microscopes, the recording was impossible to decipher.

1.12 Wreckage

The accident site was approximately 280 m before the threshold of runway 17 and 450 m from the extended runway centre line.

1.13 Fire

About 390 m from the point of initial impact the port wing struck a clump of trees. This caused the fuel tanks to burst and, as the fuel escaped, fire broke out.

The type of fuel being used, JP. 1, and the fact that the fire was located some distance from the fuselage permitted all occupants to evacuate the aircraft. Minutes later it spread to the aircraft's fuselage. The airport had no fire fighting equipment and firemen from Cordoba City had to be summoned. However, it took them about half an hour to reach the site and, since they were inadequately equipped, they had to fight the fire with earth and water.

1.14 Survival aspects

Evacuation of the aircraft was by the front port door and the emergency exits on the starboard side. Neither the front nor the rear starboard doors could be opened. The safety lock of the rear one was jammed.

1.15 Tests and research

An analysis of the approach procedure was carried out on the radar simulator at the Centre for Regular, Advanced and Specialized Air Traffic Training. According to this analysis, the times ascertained from the control tower's tape recording and the height and speed data available, the pilot-in-command had executed an unauthorized procedure. Sketches of the flight path revealed the manner in which the pilot-in-command modified the approved procedure.

A flight was made in a Caravelle from Pajas Blancas Airport to execute the same approach procedure as that used on the day of the accident. It revealed that it is almost impossible to land on runway 17 and expect to intercept VOR radial 168, since a very sharp turn has to be made to align with the runway centre line, a manoeuvre which is not advisable for low-level night flying on instruments.

2. Analysis and conclusions

2.1 Analysis

Since ceilings were less than 400 m and steadily lowering, an instrument approach procedure to runway 17 had to be made.

Following the accident the co-pilot stated that when the aircraft intercepted the VOR radial during the first attempt, it was 200 m above the ground, and the pilot-in-command decided to go around on 105°. At that time the tower operator informed him that he could see the aircraft on track E and asked whether they were heading for the alternate. The co-pilot consulted the pilot-in-command and then replied that they would make another attempt. At this time there was a break in the clouds over the northern part of Cordoba City and some buildings and lights could be seen. The co-pilot stated that during the second attempt, just before intercepting the VOR radial, his altimeter showed a height of 135-140 m above the ground when he looked out, seeking a visual reference. He saw lights ahead and moments later the aircraft struck the ground.

On 1 April 1963 two instrument approach charts were issued by the aeronautical authorities for this runway: one for jet aircraft using the VOR facility and the other for jet aircraft using the Cordoba radio beacon. Either of the two procedures could be used for landing on runway 17, but no chart existed that combined the two. However, the pilot used an unrecognized combination of the radio beacon and VOR procedures.

The meteorological minima for each procedure, i.e. the critical height at which a missed approach procedure shall be initiated if visual contact with the ground is not established, was 160 m by night as well as by day. The airline had also published on 11 April 1963 an instrument landing chart (jet) for runway 17. Although this chart differed slightly from the one published by the aeronautical authorities and had not been submitted to their approval the procedure was in accordance with the officially established guidance and separation procedures and showed the same critical height of 160 m. The pilot did not observe this minimum. The recording of the air-ground communications revealed that during the first attempt to land he descended down to 150 m, and the accident proved that during the second attempt he descended even lower.

The critical height for Caravelle at Cordoba Airport was subsequently raised to 200 m by the airline. This was notified in a Circular dated 30 April 1963 and in a NOTAM dated 7 May 1963. Both the pilot-in-command and the co-pilot were unaware of that amendment.

The air-ground communication recording also indicated that the tower controller was unfamiliar with the instrument approach procedure. He should have warned the pilot-in-command that the prescribed height for initiating the procedure was 3 300 m. Also, when the pilot stated that his outbound track was 040°, the controller should have given him the correct track instead of indicating his approval. Finally when the pilot reported he had descended to 150 m without making visual contact and confirmed this a minute later, the controller did not check the meteorological situation. In the prevailing circumstances, he should have warned the pilot, that conditions at the airport were below the operational minima and cleared him down to the specified critical height.

During the final phase of the approach procedure, at 1904 hours, when the tower advised the aircraft that the ceiling had lowered down to 150 m, the pilot had sufficient time to increase thrust and execute a missed approach.

Material gathered during the investigation showed that weather reports at the airport differed considerably. The aircraft carried out the missed approach at 1854 because it could not make visual contact at 150 m. Yet shortly thereafter the tower gave ceiling as 300 m and estimated visibility 6 km, which reveals a significant deficiency in the flight advisory services.

2.2 Conclusions

Findings

The pilot-in-command was properly certificated and had considerable flying experience.

The aircraft had a valid Certificate of Airworthiness and had been satisfactorily maintained. The report contained no information regarding the aircraft's weight and centre of gravity at the time of the accident.

Although the weather forecast for the flight was prepared on the basis of the 0900 hour chart which was nearly 9 hours old at the time of take-off, this was not a factor contributing to the cause of the accident. It does, however, show negligence in the preparation for the flight since a new forecast could have been prepared.

Because of the low ceilings at Pajas Blancas Airport, an instrument approach had to be made to runway 17. Two procedures can be used for landing on this runway but no chart exists which combines them. However, the pilot used an unrecognized combination of the radio beacon and VOR procedures, and descended below the critical height of 160 m. Actually the critical height for Caravelle operations at the subject airport had been raised from 160 m to 200 m by the airline in April-May of 1963, however both the pilot and co-pilot were not aware of the amendment.

Although the aircraft carried a flight recorder, fire damage to the tape destroyed the evidence.

No fire fighting equipment was available at Pajas Blancas Airport. The fire fighting services which came from Cordoba City took approximately half an hour to reach the accident site and on their arrival they had to fight the fire with earth and water as they were not properly equipped.

The two starboard doors of the aircraft could not be used for evacuation purposes. The safety lock of the rear door was jammed.

Cause of
Probable cause(s)

Striking the ground during final approach, when the pilot failed to execute the approved instrument entry procedure.

3. Recommendations

No recommendations were contained in the report.

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ICAO Ref: AR/881

ACCIDENT TO CARAVELLE LV-HGY,
OF AEROLINEAS ARGENTINAS,
AT PAJAS BLANCAS, ARGENTINA.
3 July 196 3 JULY 1963

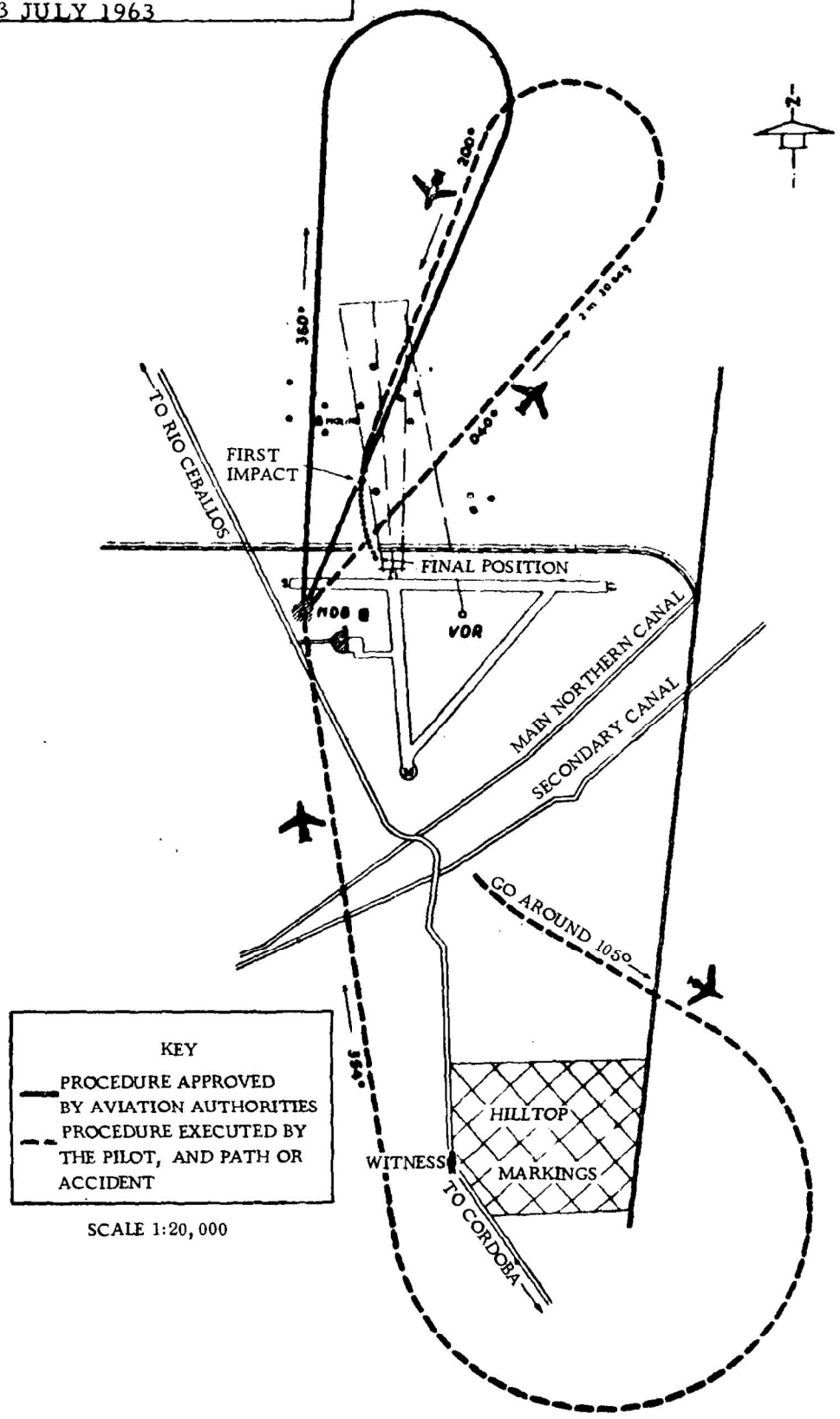

FIGURE 10