No. 5

DC-4 BBDO aircraft, crashed at Mount-Cameroon (Nigeria), on 3 February 1951

(Note:- The accident, which occurred in British territory, was investigated by France with a British observer present. This procedure is in accordance with Annex 13 of the Convention on International Civil Aviation.)

Circumstances

The aircraft, en-route from Douala to Niamey with twenty-three passengers and six crew members aboard, crashed into the Cameroon Mountain in the British Cameroons, 12 kilometres north of Bouea and approximately 60 kilometres from Douala. The crash occurred approximately 8,500 feet above sea level. All the passengers and crew were killed and the aircraft totally destroyed.

Investigation and Evidence

The DC-4 aircraft landed at Douala at 1200 hours and after refuelling, etc., took off at 1408 hours. The route forecast at the time was favourable for the whole route - no disturbances - over high ground the sky cloudy to slightly cloudy with stratocumulus or cumulus with cloud base at medium altitudes. In the Cameroon Mountain area the cloud was more extensive with 3/8 to 5/8 cumulus up to 3,800 metres and cloud base between 300 and 600 metres. Winds S.W. 6-8 knots up to approximately 1 000 metres - ENE, 5 to 10 knots at 2 000 metres and East 10 to 15 knots above 3 000 metres.

There are two departure routes specified for leaving Douala:

Route 1: The northern one, to Kano, leaves Douala and follows a track of 360° (magnetic);

Route 2: The southern route passes along the straits between Cameroon Mountain and Fernando Po Island - 225° (magnetic) - for a distance of 54 km. then turns at right angles taking a 305° (magnetic) heading towards Port Harcourt.

These two routes, particularly the latter one, ensure flight safety by avoiding the higher terrain.

The flight plan indicates that the pilot intended to take Route 2 and planned on a four-hour flight to Niamey at an altitude of 8 500 ft. Witnesses in a following aircraft stated that the DC-4 after take-off proceeded for three or four minutes on the 220° heading and then made a sharp climbing turn to NNW and disappeared into cloud at about 1 000 metres. This heading corresponds roughly to the direct route to Niamey. A witness at Ekona in the British Cameroons, approximately 45 km. from Douala and bearing 300°, saw the DC-4 pass over, still climbing, and clear of clouds, heading straight towards the first edge of the Cameroon range, which was all that could be seen of the range. He followed the flight for approximately 5 minutes and after the aircraft crossed the line of summits, the sound of the engines stopped. The aircraft after crossing, at right angles, a first ridge approximately 2 500 metres in height, found itself facing the mountain, the summit of which rises to more than 3 000 metres directly above the scene of the accident. Marks on the ground indicate that at the time of first impact the aircraft was turning sharply to the left with a bank angle of 45 degrees. It was not possible to determine with certainty what reasons led the pilot to depart from the established procedure and immediately take the en-route heading. It was noted, however, that by taking this new route it was possible to shorten the flight and also avoid a more cloudy area to the south of the mountains.

Estimation of Drift

With zero wind, it is possible, with the heading selected, to fly round the Cameroon range to the North. The wind indicated in the route forecast, although from the SW at ground level, was NE above approximately 1 200 metres and increased to 15 knots above 2 000 metres. Allowing for the fact that winds increase in velocity near mountains, it can be estimated that the wind in that area exceeded 20 knots and that the drift between 2 000 and 3 000 metres would have been about 10° to port. In this area in the prevailing conditions, changes in wind direction of about 180° between different altitudes could be encountered and, unless special care is taken, can cause considerable drift.

Visual Error in Judging the Mountain Area

Since the crew were able to see the mountains it is probable that they did not bother to check their navigation carefully and allowed the aircraft to drift to port, i.e., towards the higher elevations, under the influence of the NE wind.

To a pilot facing the sun, Cameroon Mountain, seen through the mist, is only faintly and partially visible. Furthermore, the clouds which form on the mountain may distort its appearance and hide certain ridges. Seen by an observer approaching from Douala, the Cameroon mountain mass has roughly the appearance of an irregular cone, the left-hand side of which slopes at an angle of 45 degrees, whereas the right-hand slope, which is less steep, extends the crest line towards the North-East. The pilot may have believed

he had crossed the first ridge, which was perfectly visible, at a point which left a reasonable margin of altitude, but, being misled by the drift, he may have actually approached at another and higher point further to the West.

Clearing this first obstacle by about 150 metres, thanks to the assistance of a slight air current rising above the mountain, he suddenly saw a second and higher ridge appear before him out of the mist.

It then became obvious to the crew that, not having an adequate rate of climb, they would not be able to clear this new obstacle. In order to avoid it, the pilot tried a sharp turn to the left where he saw a gap. The aircraft, caught in a downward air current, and not having sufficient room to make a complete 180° turn, was unable to avoid hitting the steeply rising ground with its port wing.

It is probable, moreover, that, by the time the pilot saw the second crest, no diversionary action was possible either to avoid a crash or to limit its effect.

Results of Investigation

The radio aids were functioning and there was a sufficient number of them to ensure accurate navigation. No unfavourable report concerning the quality of their operation was received. The wind was SW up to 1 200 metres, but turned right round to the opposite direction to reach NE 20 knots in the neighbourhood of Cameroon Mountain. The weather was generally favourable with some cloud over the mountains and visibility was reduced by the mist when facing the sun.

The instructions laid down by the airline for its aircraft at Douala covered arrival only. No instructions were laid down for departure.

After having selected the Southern route, the pilot changed his plans and took a route parallel to the Northern exit.

An error was made in judging visually the height of the mountains in the path of the aircraft. This error was due to the weather conditions and to a position error due to an unchecked drift.

The crash occurred when the aircraft was making a sharp turn to the left.

The navigation was not sufficiently accurate although it cannot be stated whether or not the crew did attempt to use the aircraft's radio compass nor whether the information obtained from it was correct.

Probable Cause

On their own initiative, the crew abandonned the current procedure and followed a different and inaccurate procedure.

The navigation was not sufficiently accurate and the draft was not checked.

Error of judgment and over-confidence when flying over a mountain mass.

ICAO Ref: AR/220