

No. 9

Union Aéromaritime de Transport, DC-6B, F-BIAO, accident on the slopes of
Mount Cameroon, Federal Republic of Cameroon, on 4 May 1963.

Report, dated 13 December 1963, released by
The Director of Civil Aviation, Cameroon.

1. Investigation1.1 History of the flight

The aircraft was on a scheduled international flight from Douala, Cameroon to Lagos, Nigeria. It was on charter to Air Afrique. Aboard were 7 crew members and 48 passengers. The aircraft took off from runway 12 at Douala at 1316 hours GMT on an IFR flight plan which specified a routing over M'Banga by the northern passage and a cruising altitude of 16 500 ft. Allowing 28 minutes to reach FL 165, this would mean an average rate of climb of 600 ft/min. The flight was authorized to make a turn to the right when it was about 250 m above the end of the runway. The pilot-in-command reported subsequently that he was taking the southern passage. The control tower at Douala requested the flight to report when passing the radio beacons at Santa Isabel and Calabar. At 1320 hours it reported that it estimated it would be passing these two points at 1330 and 1344 hours respectively. Three minutes later it contacted Brazzaville and reported that it was flying in visual meteorological conditions, at flight level 30, climbing to flight level 165 and that it was estimating leaving the FIR at 04°15N - 08°30E around 1338 hours. At 1325 it contacted Kano and gave the same information about leaving the FIR and its estimated time of arrival at Lagos. Brazzaville and Kano acknowledged receipt of the messages and requested that the flight report on leaving the FIR. The aircraft was seen over Tiko (30 km from Douala) and heard in the vicinity of Buea (6 km from the crash site). Although Brazzaville attempted to contact the flight after 1354 hours, nothing further was heard from the flight. The aircraft struck Mount Cameroon in a straight climb at an altitude of approximately 6 500 ft, i.e. about 800 m below the peak which is about 2 800 m high in this region. The time of the accident was estimated as about 1327 hours, i.e. 11 minutes after take-off. The site of the accident (04°09'30"N - 09°11'10"E) was 3 NM west of Buea and approximately 34 NM and on a heading of 293° from the Douala VOR.

1.2 Injuries to persons

Injuries	Crew	Passengers	Others
Fatal	7	48	
Non-Fatal			
None			

Two passengers survived for a few days. One died on 6 May, the other one on 9 May 1963.

1.3 Damage to aircraft

The aircraft was destroyed by impact, explosions and fire.

1.4 Other damage

No damage was sustained by objects other than the aircraft.

1.5 Crew information

The crew consisted of the following: a pilot-in-command, a co-pilot, a radio operator, a flight engineer, a cabin steward and two assistant stewards. The crew complement was in accordance with the existing regulations.

The pilot-in-command, age 52, held an airline transport pilot's licence and a navigator's licence, as well as an IFR rating renewed on 9 April 1963, and a DC-6B rating. His licences and ratings were valid at the time of the accident. His last flight test had been carried out from 10 to 13 January 1962, after his flying duties had been interrupted for four months for health reasons. Similarly his last link trainer test was carried out on 3 and 4 April 1962. Certain reservations were attached to the results of both tests. While not thinking that could have played a part in the accident, and noting that the pilot-in-command had 6 561 hours' experience with the DC-6B, about half that time being night flying, the Board regretted that the file of the pilot-in-command did not contain the results of more recent tests. It appeared also that the pilot-in-command had neglected to re-validate his restricted international radiotelephony rating which had expired on 4 April 1963.

The co-pilot was 31. He held the required licences and ratings, all valid, as follows: airline transport pilot's licence, DC-6B co-pilot's rating, instrument flight rating, restricted international radiotelephony rating. His last flight test was on 22 March 1963. He had flown a total of 4 811 hours. His DC-6B experience amounted to 3 435 hours of which about 50% were flown at night.

The radio operator, age 27, held a radio operator's licence. His restricted radiotelephony rating had expired on 28 July 1962. His total flying experience amounted to 2 589 hours and included 1 727 hours on the DC-6B. In the 60 days before the accident he flew about 119 hours on the DC-6B.

The flight engineer, age 50, had a flight engineer's licence and a DC-6B rating. His most recent flight test was on 9 January 1962 and on the link trainer it was on 13 to 15 December 1962. His total flying experience amounted to 13 629 hours which included 5 237 at night. At the time of the accident his DC-6B experience was 8 323 hours which included 114 hours flown in the 60 days prior to the accident.

These four crew members all held valid medical certificates at the time of the accident and their flying activity during the three weeks preceding the accident did not substantiate the possibility of fatigue.

They were well acquainted with the Douala-Abidjan coastline and the Mount Cameroon region. Each crew member had flown regular tours of duty lasting from 8 to 10 days in Central and Equatorial Africa with several flights to Douala during each tour of duty.

1.6 Aircraft information

A Certificate of Airworthiness was issued for the aircraft on 28 June 1958.

Since its last periodic overhaul it had flown about 634 hours.

Maintenance on the aircraft had been carried out regularly by the Operator in accordance with the maintenance manual provided. All required DC-6B modifications had been made on the subject aircraft.

At the time of departure from Douala the aircraft's weight and centre of gravity were within the permissible limits.

The type of fuel being used by the aircraft was not stated in the report. According to the load and trim sheet, the aircraft carried 5 442 kg of fuel at the time of take-off from Douala, corresponding to 2 100 US gallons of fuel, which exceeded the amount of 1 700 US gallons recommended by the Company's operations manual for the Douala-Lagos flight.

1.7 Meteorological information

The following conditions existed at Douala Airport at 1316 hours, the time of departure:

temperature: 32.2°C; humidity: 60%; wind: 180°/6 kt;
visibility: 50 km, Mount Cameroun was visible;
cloud: 3/8 cumulus, base 800 m; QNH: 1,010 mb;
QFE: 1,008

M'Banga relayed forecasts to the pilot of the subject flight for the Douala-Lagos portion of the trip. They contained the following information concerning the Mount Cameroon region:

cloud: 3/8 cumulus, base 800 m, cloud tops up to 4 000 m,
altocumulus around 5 000 m, linked crests (traced
for 2 000 m along the route from M'Banga to Calabar)
wind: 0 to 2 000 m: 190 to 220°/4 to 6 kt
2 000 to 3 000 m: 080°/10 kt
above 3 000 m: 090°/20 to 30 kt

While en route the aircraft flew over Tiko Airport which is about 30 km from Douala and 25 km from the accident site. The Chief Pilot of Cameroon Air Transport arrived at Tiko at 1330 hours, i.e. about 3 minutes after the estimated time of the accident. He stated that on his arrival the sky was clear with some cloud. The peak of Mount Cameroon was visible at this time but not its slopes.

The 1400 hour forecast for Tiko was:

skies clearing; cloud: 6 to 7/8, low cloud 3/8 cumulus, base 360 m;
ground wind: 180°/10 to 12 kt; visibility: 30 km.

At the time the aircraft was heard passing the town of Buea, a thin cloud layer of 8/8 covered the Buea region. Persons in this area said that the southern slopes of the mountain were covered with a solid cloud layer having a base of around 4 000 to 5 000 ft.

Later that same afternoon the Chief Pilot of Cameroon Air Transport reported that in the crash area there was a layer of 7/8 stratocumulus, the tops of which may have reached 7 000 ft. (The accident occurred at 6 500 ft.).

At the time of the accident the condensation levels on the slopes of the mountain may have been parallel to the path of the aircraft's climb. Also, since the humidity was increasing due to the dense vegetation on the mountain slopes, the cloud thickness must have increased proportionately as the aircraft approached the mountain.

1.8 Aids to navigation

At Douala the following aids were available: 1 VHF direction finder, 1 VOR, 1 ILS, 1 radio beacon and 1 Locator, however, the direction finder was not operating at the time of the accident because of the fine weather conditions.

On the southern route to Lagos the following aids were available to the aircraft: a marker at Tiko (TI), a radio beacon at Santa Isabel (PA) and a radio beacon at Calabar (CR).

The aircraft was fully equipped and carried among other things 2 VOR-ILS receivers and 2 radio compasses. This equipment was checked in flight during February 1963 and was found to be in perfect working condition.

1.9 Communications

The control tower at Douala receives communications on HF and VHF. However, the recording of messages by the tower does not include a recording of the time.

Communications were good on the day of the accident, and the subject flight exchanged messages with Douala, Brazzaville and Kano.

1.10 Aerodrome and ground facilities

Not relevant to the accident.

1.11 Flight recorders

See paragraph 3, Recommendations.

1.12 Wreckage

The aircraft crashed on the steep slopes of Mount Cameroon at an altitude of 6 500 ft in an uninhabited and highly inaccessible region. It dug a furrow in the woods, approximately 150 m long and 50 m wide, which was mainly oriented 295° magnetic.

The aircraft was intact at impact. It was climbing with its landing gear retracted, and there was no indication of a turn or of an asymmetrical impact. The automatic pilot was presumed to be "off" at the time of impact.

Because of the inaccessibility of the site and the difficulties experienced in bringing anything down the mountain, the Board could only carry out an on-the-spot investigation and removed only a few components such as navigation and communications equipment.

1.13 Fire

Explosions and fire followed the impact and destroyed the aircraft completely. The fire lasted more than twelve hours.

1.14 Survival aspects

There was no contact with the aircraft after 1325 hours, and at 1452 hours Kano announced the uncertainty phase which was followed at 1502 hours by the alert phase. Brazzaville also declared the alert phase at 1600 hours and the distress phase at 1635 hours. Kano did likewise at 1650 hours.

The inaccessibility of the crash site and dense vegetation hindered the search. To reach the site a footpath had to be cut through the undergrowth and could only be used by men carrying light loads or none at all. It was extremely difficult to transport the victims down the mountain and bringing down survivors was even more so.

1.15 Tests and research

On 12 May 1963 flight tests on all the VOR, ILS, radio beacon and locator equipment were carried out. All ground installations were operating normally.

Tests carried out with a UAT DC-6 showed that the ILS was correctly received beyond Tiko. There were no false ILS course lines in the sector northwest of Douala, and there was no distortion of the magnetic field in the approaches to Mount Cameroon. Headings remained constant when the aircraft followed a constant VOR radial.

The operation of the VOR had not been the cause of any comments by Air France crews during the period 1 to 15 May.

Some of the aircraft's electronic equipment was recovered and analysed in Paris. It was determined that at the time of the accident the magnetic heading of the aircraft was 305°. One of the VOR-ILS receivers was tuned to 110.3 - (ILS, Douala), the other to 112.9 - (VOR, Douala). The VOR radial marked on the selector was 278°, with the manual switch on the 180° position.

1.16 Operating procedures

The Company's operations manual was found in the wreckage. At the time of the accident it forbade making use of the southern path for the Douala-Lagos route, but authorized it "in VMC only" for the Douala-Cotonou route. The UAT representatives said that this was due to a typing error and that as contained in former manuals up until the beginning of 1963 the southern path was authorized for both routes "in VMC only". Representatives of the competent Administration said that the southern path is not prohibited in VMC for the Douala-Lagos route.

2. Analysis and conclusions

2.1 Analysis

After taking-off from Douala the flight took a heading which led it straight into Mount Cameroon. The actual mean magnetic course flown by the aircraft between Douala and the crash site was 293° . Weather conditions were very favourable and the crew was certainly able to see the ground and Mount Cameroon, at least as far as Tiko. There is no doubt that the route towards Tiko and Mount Cameroon was deliberately chosen by the crew and that the aircraft was flying in instrument meteorological conditions when the crash occurred. It is extremely difficult to explain why the crew continued on the same heading towards Mount Cameroon after having passed over Tiko and even more so after having transferred to instrument flying.

Activities of the crew prior to the subject flight were examined and did not disclose anything indicating a possible indisposition of the crew at the time of take-off. Although the conditions of the bodies did not permit a medico-legal analysis, statements of the passenger who survived for five days after the accident, and the coherence of the crew's transmissions led the Board to conclude that no in-flight intoxication by fuel or hydraulic liquid had occurred.

Examination and tests did not disclose any breakdown or failure of the navigational aids on the ground or of the equipment on board the aircraft. No indication of a loss of control of the aircraft was found. Based on the fact that one of the VOR-ILS receivers was tuned to the ILS Douala, the other to the VOR Douala and that the VOR radial marked on the selector was 278° , (approximately the northern limit of the southern pass), the Board examined the possibility of a confusion between the VOR and the ILS. Assuming that the crew confused the ILS back beam reading with that given by the VOR on radial 278° and that it took a southern safety limit with reference to the back beam (304°), mistakenly read as 278° , it could not fail to strike the mountain. However, this assumption was not accepted by all Board members. If a confusion of VOR and ILS did take place, this could only have been due to general inattention and to a lack of observation of other aircraft instruments.

2.2 Conclusions

Findings

The weight and centre of gravity of the aircraft were within permissible limits at the time of take-off from Douala.

The aircraft and its equipment had been regularly maintained and were in good working order. No indication of any malfunctioning was found.

The crew had valid certificates, licences and ratings to carry out the planned flight. It had sufficient experience on the route.

Navigation aids and air-ground communications equipment were operating, and nothing was found to substantiate any doubt concerning their good working condition. They were ample to provide the aircraft with an accurate route.

Ground winds were southerly, 6 to 12 kt, changing to east 10 kt at 2 000 m. There was no severe turbulence nor any downdrafts over the southern slopes of Mount Cameroon.

The weather was good and could even be considered as exceptionally fine for the area. Visibility at Douala exceeded 50 km.

After having planned an exit via M'Banga in his flight plan, the pilot decided, after take-off, to take the southern passage, which was contrary to the Company regulations in his possession.

Immediately after take-off from Douala, the aircraft climbed along a route which took it over Tiko and straight to the slopes of Mount Cameroon. The foregoing leads to the conclusion that the choice of that route was deliberate.

If an error had been committed with regard to calculating drift or heading, and even if there had been a faulty indication of any component of the aircraft's navigation equipment, a brief navigation check, which would have been possible along part of the route by observing landmarks, could have prevented the accident.

Between Tiko and Mount Cameroon the aircraft was flying in instrument meteorological conditions.

Impact occurred when the aircraft was climbing practically in a straight line.

Cause or
Probable cause(s)

The accident was caused by a lack of caution on the part of the pilot-in-command, who deliberately selected a route which led the aircraft into a dangerous and even prohibited sector at too low an altitude. Also, he neglected his navigation and transferred to instrument flight when approaching the mountain range.

3. Recommendations

The Investigation Board urged the services concerned to take the following steps:

1. Operator should issue precise instructions for operations on the Douala-Lagos, Douala-Cotonou, Lagos-Douala and Cotonou-Douala routes, in order to stress as clearly as possible:
 - a) the prohibited sector including the Cameroon mountain range and the safe VOR radial limits;
 - b) the altitudes which it is imperative to respect when entering or leaving the northern or southern passage and, when necessary, the manoeuvres required to reach a certain altitude prior to taking a heading.
2. To equip Douala Airport with suitable equipment, such as aerodrome radar, for checking that safety regulations are observed - until such time to ensure such checks by using the VHF direction finder available at Douala. Regulations have been drawn up to this effect.

3. To apply to all public passenger transport aircraft exceeding 5 700 kg the provisions of the Decree of the French Ministry of Public Works and Transport, dated 4 October 1963, regarding flight recorders.
4. To stipulate that operators should adhere strictly to the existing regulations regarding validity of ratings and flight tests of crews.
5. To ensure, during the annual tests by Company instructors, that pilots use correctly and at all times all means available to them on the ground and aboard the aircraft for checking their position en route as well as during the approach.

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