

No. 55

Union Aeromaritime de Transport, DC-6B, F-BGTZ, accident at Salisbury Airport, Southern Rhodesia, on 26 December 1958. Report released by the Federal Department of Civil Aviation, Rhodesia - Nyasaland.

Circumstances

The aircraft was operating U. A. T. scheduled service UT. 736 (Johannesburg-Salisbury-Brazzaville-Nice-Paris). It took off from Salisbury Airport at 1252 hours for Brazzaville and during take-off from runway 24 entered rain. The aircraft climbed to about fifty feet and then began to lose airspeed and height. Although the captain was using full power, had 20° of flap extended and the undercarriage retracted, he was unable to prevent the aircraft sinking back on to the ground. Fire broke out immediately after impact. Of the 7 crew and 63 passengers on the aircraft, 3 of the passengers lost their lives.

Investigation and EvidenceThe Wreckage

The first contact with the ground was a gouge mark caused by the tail skid at a point 1 900 ft from the southwest end of runway 24 and 220 ft to the right of the centreline. After impact the aircraft slewed slightly to the left and almost simultaneously numbers 1 and 2 propellers, the under-fuselage cooling air scoop and the number 3 propeller made contact with the ground, followed by number 4 propeller. As the aircraft settled, the under-fuselage and engine nacelles began to break up and the left wing inner flexible fuel cells and the wing root alcohol tank ruptured, and fire broke out. The aircraft continued to slide forward slewing to the left and shedding propellers, pieces of under-fuselage, wing and nacelle structure, but suffering no major break-up. It finally came to rest 1 450 ft from the point of initial impact and had slewed to the left through 135° from its original heading.

Further examination of the wreckage showed the main undercarriage and nose wheel to be in the fully retracted position. The flap and flying control systems were severely damaged but no evidence of pre-crash failure or malfunction could be found. It was impossible to ascertain the flap or control trim settings. All instruments were incinerated and no readings could be obtained.

Detailed examination of the four engines revealed no mechanical defect. The domes of all propellers were removed and it was ascertained that the blade angle of each was in the constant speed range on impact. All engine reduction gear casings and front covers were torn out, still attached to the propellers. From the foregoing evidence, and the extensive damage suffered by the blades of each propeller, it was evident that all were under a high degree of power on impact.

The Aircraft

The aircraft had been correctly maintained and was properly documented. The weight at take-off was 170 lb (77 kg) below the maximum permissible. The centre of gravity was within authorized limits.

The Weather

The captain and crew were briefed at approximately 1155 hours by the duty meteorological officer. The briefing included the information that there would be isolated storms at a distance of 20 to 40 miles from the airport on a true bearing of 300° to 330° which would be approximately along the track to Brazzaville; these storms were shown to the crew on the meteorological radar screen. There was no indication at this time of a storm to the east or southeast of the airport.

At 1240 hours it was observed that a storm was building up to the south-east of the airport and the meteorological officer on duty telephoned the control tower and stated that there might be gusts prior to or at the time of arrival of the storm at the airport.

At 1250 the storm to the southeast had approached the airport and the edge of the curtain of rain was about 1 200 yards to the south of the terminal building.

As the aircraft commenced its take-off, the edge of the rain reached the intersection of the runways, but the north-east end of runway 24 was clear of rain. The aircraft became airborne at about the intersection of the runways and disappeared into heavy rain.

The storm moved across the airport very quickly, estimated by the meteorological observers as between 20 and 30 miles per hour. There was about 5/8 of cloud cover with the sun shining between the cloud patches, which made the storm seem lighter than was in fact the case.

During the short period between the commencement of take-off and the crash (estimated at 45 to 50 seconds) the rain had become so intense that the air traffic control officer in the control tower could not see the aircraft after it had passed the intersection of the runways, and in fact did not see the crashed aircraft until some ten minutes later, even when he knew its position and that it was burning fiercely.

Surface wind speed and direction at Salisbury airport can be assessed from:

- a) an anemometer head situated about six feet above ground level and 600 ft to the south-southeast of the control tower, which is connected electrically to dials both in the A. T. C. O. 's console and the meteorological briefing

office giving accurate and continuous readings; the former reading is passed by the A. T. C. O. to pilots by radio;

- b) an anemometer head situated 44 ft above ground level at Kutsaga Meteorological Station, recording graphically on a paper trace and which is used for record purposes;
- c) wind socks close to the ends of each runway giving a visual indication of direction; the speed can be estimated from the attitude of the sock by an experienced pilot.

Whilst all the above can give wind speed and direction at each precise position, they can never act as more than a guide to the wind speed and direction some 40/50 ft above ground level in the vicinity of the runway intersection. However, they indicated in this particular accident rapid changes in both speed and direction prior to and during take-off.

The Accident

The aircraft requested taxi clearance and take-off instructions by radio telephony at 1245 hours. The A. T. C. O. on duty replied that the surface wind was "Northerly at five knots" and the aircraft was cleared to taxi out to runway 06. At 1246 hours this was altered to "use runway 24 to expedite your clearance", and at 1248 hours the A. T. C. O. asked the aircraft to "try and expedite your take-off as this rain appears to be coming across rapidly". At 1250 hours the captain stated that he was ready to take off and clearance was given together with the surface wind as "one four zero degrees at 18 knots". This information was repeated back by the captain in acknowledgment. At 1252 hours the aircraft called over the radio and said "FTZ airborne at 1252". As the A. T. C. O. acknowledged this call the aircraft disappeared from view into heavy rain at about the intersection of the runways. At the time of commencement

of take-off the weather conditions were within the minima laid down by the airline for operations at Salisbury Airport.

The captain, first officer and flight engineer confirmed that on entering the rain, the aircraft built up speed normally from V. 2 speed (in this case 111 knots) to about 118/120 knots in the climbing attitude and the wheels retracting. Then the airspeed started a steady and positive decrease and, although all engines were giving maximum power the captain was unable to keep the aircraft airborne and it struck the ground in a slightly tail down attitude 220 ft to the right of the centreline, and 1 900 ft from the southwest end of runway 24. The aircraft came to rest 1 450 ft beyond the point of first impact after sliding along on its under-fuselage in heavy rain, and with the mainplane area burning.

There were no eye witnesses to the actual crash due to the heavy rain and the burning aircraft was not seen until the smoke and flames made it visible to an African Meteorological Observer in the Kutsaga Meteorological Station which is situated about 1 000 ft from the final position of the aircraft.

It is clear that, as the crew stated in evidence that they were quite satisfied with the performance of the aircraft, its power output and the response of the controls, and since nothing in the wreckage could be found to indicate any mechanical defect, there was nothing mechanically wrong at the time of the accident.

Consideration was then given to the following questions:

- a) Was the captain justified in attempting a take-off in the weather conditions prevailing, and should he have abandoned the take-off and brought his aircraft to rest on the runway when he reached the highest point of the runway and saw the rain in front of him.

- b) Did the A. T. C. O. do all he could to warn the captain by radio telephony of the progress and nature of the storm, including the possible suggestion that the take-off should be delayed, and was he justified in sending the aircraft off on runway 24 instead of 06?

World-wide accepted practice is for the captain to make the final decision regarding the advisability of the take-off or landing of his aircraft, except when either would endanger other traffic. In other words, the captain is in a far better position to judge the performance and capabilities of his aircraft under a given set of circumstances than is the A. T. C. O. in a control tower. The latter's function is to pass to the captain all the relevant information he has at his disposal.

Changes of wind speed and direction accompanying the onset of a thunderstorm can be violent and unpredictable, and will momentarily either increase the aircraft's speed through the air, or decrease it according to whether the wind is from ahead or astern of the aircraft. Any decrease of airspeed when the aircraft is flying comparatively slowly (as is the case immediately after take-off) will cause a proportionately large reduction in the lift being generated by the wings, and in this particular case the wind effect acting on the aircraft necessary to cause a loss of airspeed (and therefore lift) was considerably more than that recorded by either anemometer. It is estimated from the information available from the two anemometers and from witnesses' statements, that the aircraft encountered a tailwind component of approximately 40 knots shortly after becoming airborne. As the aircraft was near the ground when it encountered this loss of airspeed and lift, the pilot was unable to prevent it striking the ground before it had time to accelerate out of the tailwind component.

The strength of the actual squall that affected the aircraft is unknown, but it was of sufficient intensity to cause not only the loss of airspeed and lift mentioned

earlier, but to carry the aircraft 220 ft to the right of the runway centreline in the short period of about 17 seconds that it was airborne, and to carry most of the debris well to the right of the aircraft's path along the ground.

In addition, the heavy rain falling at the time would carry with it a down-draught of air and the effect on the aircraft of such down-draught cannot be discounted.

The questions posed above were given very careful consideration and it was agreed:

The captain is a very experienced pilot; he has a wide knowledge of the DC-6B and its performance and is familiar with the route Paris-Johannesburg. After his meteorological briefing and what was visible to him of the storm whilst taxiing out to take-off, he had no reason to suspect that the storm would affect take-off performance in any way. Further, whilst the aircraft was stationary at the threshold of runway 24, the pilot's line of vision would be at an upward angle due to the profile of the runway and he was unable to see the progress of the storm along the ground until his aircraft had reached the highest point of the runway; by this time he had attained V. 1 speed and was very close to V. 2. When at this point, the captain considered abandoning the take-off when faced with the curtain of rain in front of him, but dismissed it immediately, having regard to the wet state of the runway and the down gradient in front of him: he decided to continue. This decision had to be made very quickly and the captain was satisfied at the time that it was safer to continue than to try and stop: it was considered that his decision to take-off, and then to continue, was justified.

Whilst the aircraft was taxiing away from the terminal building prior to take-off, the air traffic control officer was watching the approaching storm.

Having considerable experience at Salisbury Airport and of the local weather, he was satisfied that the aircraft, if dispatched on the shorter route to runway 24 instead of runway 06 would have ample time to become safely airborne before the storm reached the runway. In addition, runway 24 gave the pilot a shorter turn after take-off for the direct route to Brazzaville and also kept the aircraft well clear of the gliding operations centred 12 miles to the north of Salisbury. He was aware of the possible effects of thunderstorms on the take-off and landing of large aircraft, but was misled in this instance by the rapidity with which the storm moved across the airport, and by the violence of the changes in wind speed and direction. His failure to appreciate the effects of this particular storm may have been due in some measure to the fact that the sun was shining in areas adjacent to the airport. The appearance of the storm was extremely deceptive. In point of fact, the storm moved across the airport much faster than either the pilot or the A. T. C. O. realized would be the case, and there is no doubt that they both underestimated the violent changes in wind speed and direction that accompanied it. As to whether the aircraft should have been sent out on runway 06, the surface wind speed and direction readings available to the A. T. C. O. prior to the aircraft taxiing out were such that it was immaterial which runway was used.

The rapidity with which these conditions developed, and the lack of significant, visible, evidence as a warning of their likely effect on the aircraft, were such that neither the captain nor the A. T. C. O. can fairly be blamed for the accident.

Probable Cause

The aircraft struck the ground shortly after take-off as a result of an uncontrollable loss of airspeed and height due to a sudden squall accompanying the onset of a thunderstorm.

(Further information on the meteorological aspects of this accident is to be found in the article in Part III entitled - "Hazards of Landing and Take-off in the Vicinity of Advancing Thunderstorms". The similarity of the circumstances of this accident and

one which occurred at Kano, Nigeria in June 1956 is of interest. The latter accident report is included in ICAO Accident Digest No. 8, Summary No. 21.)

FIGURE 31

