

No. 35

Dakota ZS-AVI aircraft, made a forced landing on 15 September 1952
at Carolina, Tvl. South Africa, Aircraft Accident Report No. 43/52
J. 10/2/685

Circumstances

The aircraft carrying a crew of 5 and 14 passengers, took off from Livingstone Airport to Palmietfontein on a non-scheduled flight on 14 September 1952. Atmospheric conditions were abnormally bad and communications generally were affected adversely. Towards the end of the flight the captain was completely lost and crashed whilst attempting to land at an unlighted airport. There were no fatalities or injuries.

Investigation and Evidence

Approximately ten minutes after take-off, course was altered to 135°M to circumvent a storm. This heading was maintained for approximately 15 minutes. The course was then altered to 30 degrees to starboard for a further 15 minutes to regain track. The aircraft was then climbed to 1 500 feet above the ground to a flight level of 9 500 feet AMSL, which was attained at 1745 on a compass course of 177°M.

A ground speed and position check carried out at 1755 gave a ground speed of 173 mph and this was obtained between the following two positions 18°50'S 26°05'E and 20°00'S 26°22'E. At this stage darkness was setting in and the Captain requested the Radio Officer to obtain a fix (QFT). This fix was not obtained because the Radio Officer was changing over to the night frequency.

After changing over to night frequency (3105 kcs.) the Radio Operator tried several times to contact Salisbury and Germiston from 1800 to 1840, with negative results. He changed back to 6510 kcs. and from 1840 to 1850 he again tried to contact Salisbury and Germiston with negative results. At 1900 he changed back to night frequency and then he was successful in contacting Germiston but reception was poor in both directions.

A second check was obtained at 1909 when the aeroplane passed over a town illuminated by electric light on a railway line and which the pilot assumed to be Mahalapye. This assumption placed the aeroplane 18 miles starboard of track which gave a ground speed of 178 mph and a revised ETA for Palmietfontein of 2040 which was transmitted to Palmietfontein. No alteration of course was made at this point because the meteorological report indicated a gradual backing of wind from this stage onwards. Darkness and numerous veld fires made map reading difficult.

At 1938 the aeroplane passed between two towns which were assumed to be Warmbaths to the right and Nylstroom to the left. This assumption was based on the fact that at this time flying conditions, which had been relatively smooth, suddenly became turbulent from which the Captain deduced he was passing over high ground. This further assumption, together with his knowledge of Warmbaths, made him reasonably confident of his position, and in view of this an alteration of course of 22° to starboard was made. Hartebeestpoort Dam beacon was then picked up on the radio compass and indicated that the Beacon was 30° to port of his heading; his reaction to this was that it could not be possible since his previous assumption already made the position of the aeroplane 40-50 miles to port of track. He then attempted to contact Palmietfontein on VHF to obtain a homing so that his position could definitely be established but contact could not be made.

Whilst attempting to get this homing, the first officer drew the Captain's attention to the fact he had again picked up the "HB" coding signal of the Hartebeestpoort Dam beacon. The Captain then switched over to the "Aural" (Antenna) position and heard the "B" of "HB". On switching over to the "Visual" (Compass) position the radio compass needle again pointed steadily 30° to port.

The Radio Officer, however, informed the Captain that the Johannesburg English Programme was broadcast on a frequency of 782 kcs. and that he should use this frequency in order to get a bearing on Johannesburg. This was done and the reading obtained gave a bearing of

30° to starboard. Of the two bearings obtained, the Captain decided that the "HB" Beacon was the nearer, and was also the check point for entering the corridor for Palmietfontein and altered course to 160°M which brought the radio compass needle to zero. He then instructed the Radio Officer to obtain any sort of bearings from any ground stations.

This course of 160°M was maintained for approximately 15 minutes, during which time the Radio Officer informed the Captain that Palmietfontein and Germiston were unable to give him any bearings whatsoever because the aeroplane signals could not be heard at the HF/D F station at Palmietfontein.

The Captain then attempted to locate his position by map reading, and at the same time kept a look-out for the glow of lights from Pretoria. After a while he became convinced that the radio compass was not leading him to the "HB" Beacon, firstly, because there was no sign of the lights, and secondly, he had by now decided that the signal obtained from the Johannesburg broadcast station was, in all probability, stronger than the signal received from "HB". Also his amended ETA for Palmietfontein was 2015 and it was now 2010.

The fuel reserves were then calculated, and it was ascertained that he had approximately 160 (Imperial) gallons left. He immediately went into long range cruise. The Captain then turned onto a course of 200°M and again attempted to obtain a bearing of Johannesburg broadcast station on 782 kcs. The radio compass indicated a reading of 30° starboard so he altered course to 230° and the compass needle indicated a heading of 270° towards the Broadcast station.

The Captain then turned towards the lightest part of the sky, this gave him a reading of 280°M on the aeroplane's compass.

A last attempt was made to obtain a bearing from either Germiston or Palmietfontein, and the bearings obtained indicated that these stations were behind him. The Captain then noticed lights to his left and slightly behind the aeroplane, and he immediately turned towards these lights and arrived over a town at 2025.

A red Very light was fired to indicate to the people on the ground that the aeroplane was in distress. It was then noticed that several cars were heading in a certain direction; these cars eventually stopped and formed a semi-circle with their headlights.

The Captain carried out a circuit, did a low approach over the cars and noticed a wind sock. Several dummy runs were completed and he decided to land. The Radio Officer transmitted an SOS signal with the message that they were going to land.

With the gyro instruments aligned, and after turning from "Base Leg" to "Final" the aeroplane struck high ground on a heading of 206°M. The aeroplane ran through an outcrop of rocks, burst both tires, damaged the undercarriage, and the tips were broken from the port propeller blades.

The Captain then, opened up the engines, the aeroplane struck a built-up ridge of a donga, became airborne again, and cleared telephone wires about 25 feet high which were 70 paces distant from the donga.

The aircraft then flew straight ahead for approximately one minute, vibrating excessively, during which time the Captain switched on the landing lights for the first time and carried out a landing on the aerodrome, in the direction indicated by the headlights of the motor cars. The aeroplane touched down on three points and after running 142 paces the port undercarriage collapsed, the port engine broke away, and the aeroplane tipped onto its nose and slewed to the left.

The crew escaped through the emergency exit and the roof of the cockpit, and the passengers and air hostess left the aeroplane through the main exit door in the cabin.

Comments

1. The Captain took off from Livingstone at 1645 for Palmietfontein, and the accident occurred at Carolina at 2103. He received a meteorological report and submitted a flight plan which was cleared by the Air Traffic Control Officer at Livingstone for flight under VFR conditions with Pietersburg and Germiston as alternates.

2. The Captain did not request extended hours of radio service facilities at Pietersburg.
3. On the flight plan the endurance of the aeroplane was given as 6.00 hours yet after flying for approximately 4.18 hours (1645 to 2103) the calculated fuel reserve was estimated as 1-1/4 hours. The fuel remaining in the aeroplane after landing at Carolina was 132 Imperial gallons.
4. The track from Livingstone to Palmietfontein is 166° true (plotted on Plotting Chart and calculated mathematically). The mean variation en route is 15°W. The magnetic track is therefore 181°M. The deviation according to the deviation card found in the aeroplane was shown as - 1 on a Southerly Heading. This indicates that in conditions of no-wind a compass course of 182° would have to be steered to make good the desired track.
5. The upper winds shown on the meteorological report and as handed to the Captain for the section Livingstone to 23°00'S 300°/30K for 8 000 feet AMSL and 300/35K for 10 000 feet AMSL. Therefore the compass course to steer to make good the desired track was 189° and the computed ground speed was 211 mph. (These figures are based on 173 TAS mph temperature + 7°C at 10 000 feet AMSL. The Captain states he steered a compass course of 177° and did not calculate his ground speed or drift in accordance with available meteorological reports. He commenced and continued the flight with an initial error of 5° in heading to port and based all his calculations on still air conditions which were 38 mph less than the actual ground speed.
6. Air Traffic Control at Palmietfontein had been informed on 13 September 1952 by South African Airways of the proposed flight to Livingstone on 14 September and return from Livingstone on 15 September at 1630.
7. The departure signal from Livingstone was received at Palmietfontein at 2020 on the night of 15 September. The first news received at Palmietfontien that ZS-AVI was en route from Livingstone to Palmietfontein was received at 1910. A position report originated by the aeroplane at 1997 gave the position at Mahalapye at 1905 flying at 9 500 feet and ETA Palmietfontein 2040.
8. The aeroplane radio equipment was found to be serviceable on inspection after the accident and aeroplane to ground tests conducted on 16 September 1952 revealed the equipment to be normal.
9. On the night of 15 September atmospheric conditions were abnormally bad and communications generally were affected adversely. The Captain, towards the end of his flight, was completely lost but at no time declared an emergency only stating he was lost and did not know that he was, in fact, flying over Carolina until after he landed.
10. The aeroplane struck the ground 138 feet higher than the aerodrome and at a distance of 7 500 feet from touchdown on the aerodrome. This gives an approach slope of one in fifty-four which is well within the limits of a first-class aerodrome.
11. The locality of the aerodrome was only indicated to the pilot by a semi-circle of motorcar headlights which did not conform to any recognized pattern used for night flying. The willingness displayed by the inhabitants of Carolina and their endeavours to assist the pilot to carry out an emergency landing is to be highly commended.
12. The forecast weather report furnished to the Captain of the aeroplane compared favourably with the actual conditions prevailing at the time of the flight.
13. In reconstructing the flight and taking due regard of the upper winds prevalent at the time, it would appear that Potgietersrust may have been mistaken for Mahalapye and furthermore any two towns in the Middleburg-Bethal-Machadodorp area for Warmbaths and Nylstroom. The Pietersburg and Carolina Beacons were not scheduled to function and thus were not operating during the time of flight.

Probable Cause

Primary

The primary cause of the accident was faulty navigation on the part of the Captain of the aeroplane inasmuch as he set off on an incorrect course and thereafter his visual identification of towns en route was incorrect and based purely on assumptions. Had he checked his assumed

ground speed between what he assumed to be Mahalapye and Warmbaths he would have found this to be approximately 318 mph which check would have alerted him.

Secondary

The failure of those responsible to alert Pietersburg Aeradio Station and Beacon and the excessive degree of radio interference on the Rand on the evening of 15 September due to electrical storms.

Tertiary

An attempted landing on a unidentified and unlighted aerodrome, of which the altitude was not known. Thereafter in a low approach the wheels of the aeroplane struck a rock outcrop approximately 1-1/4 miles from the aerodrome.

Recommendations

1. It should be customary for a non-scheduled operator in planning a flight to make available to the Captain of the aeroplane and Air Traffic Controller, all operational details in precisely the same manner as is done for his scheduled operations. Such a course would have completely eliminated the apparent lack of liaison between the operator and the Air Traffic Controller at Palmietfontein.
2. The inordinate lapse of time of about four hours between the filing of the flight plan at Livingstone and the receipt thereof at Palmietfontein is most disquieting and should be investigated. The aeroplane would, under normal circumstances, have been in the vicinity of Hartebeestpoort Dam when the flight plan became available to the Air Traffic Controller at Palmietfontein.
3. In view of the confusion that may arise from endeavouring to navigate by visual reference to the ground while flying at night, it appears that all public transport operations during the hours of darkness should be conducted in accordance with Instrument Flight Rules.
4. On 7 August 1952, the Department of Transport issued a notice purporting to be a Notaminvolving the cancellation of extended hours and radio facilities. This circular had no heading and caused confusion regarding the availability of Pietersburg Radio Station. It is recommended that all Notices to Airmen issued by the Department of Transport should be printed on officially headed paper, to obviate any confusion between notices and circulars. The preparation, proper supervision and circulation of such notices must be regarded as a most important function of the Department.
5. If this aeroplane had carried flares for which it was equipped, the use of such flares may have prevented the unsuccessful emergency landing.
6. All radio aids to navigation in the Union, save those on 24-hour services, should open and close at the same regular fixed times and terms such as "to suit flying" be discontinued in regard to hours of operation.