

1609

BASIC INFORMATION

AIRCRAFT: CESSNA 182H : ZS-EFM

PILOT: Fred van Niekerk (Fatal injuries) ✓

PASSENGERS: Stephanus van Niekerk (Fatal injuries) ✓
William van Niekerk (" ") ✓
Brian van Niekerk (" ") ✓

PLACE: 1,8 nm south-west of RISCO aerodrome, Rhodesia.

DATE AND TIME: 1st October, 1975. 1725 hrs.

NOTE: All times given in this report are in Greenwich Mean Time (GMT). Rhodesian time is 2 hours ahead of GMT.

C O N T E N T S

TERMS OF REFERENCE.

REPORT ON THE AIRCRAFT.

APPENDICES:

1. Operating Log
2. Probable Flight Path of ZS-EFM
in RISCO area
3. Wreckage trail
4. Photographs

APPOINTMENT AS INSPECTORS IN TERMS OF SECTION
143 OF THE AIR NAVIGATION REGULATIONS, 1954

In terms of Section 143 of the Air Navigation Regulations, 1954, I hereby appoint the undersigned officers to enquire into and report to me upon the circumstances and cause of the accident to CESSNA 182 - ZS-EFM near RISCO AERODROME, on the 1st October, 1975.

Mr. P.P. Palmer, M.R.Ae.S. - Chief Operations Officer

Mr. G.D. Pearce, C.Eng., M.R.Ae.S. - Chief Airworthiness
Engineer.

(Sgd.) I. J. BERRY
For : DIRECTOR OF CIVIL AVIATION

2nd October, 1975

1. INVESTIGATION

1.1 HISTORY OF THE FLIGHT

1.1.1 The pilot filed a flight plan with the Jan Smuts Flight Information Centre on 1st October, 1975, for a flight from Germiston, Transvaal, to Beit Bridge, Rhodesia. The routing was to the Hartebeestpoort Dam (HB) non-directional radio beacon (NDB) then direct to the PR NDB thence to Beit Bridge.

1.1.2 The aircraft departed from Germiston at 1129 hrs on 1st October, 1975, and passed the HB NDB at 1145 hrs at which position he gave estimates of 1235 hrs for the PR NDB, 1312 for the Salisbury Flight Information Region (FIR) boundary and 1345 for Beit Bridge. He landed at Beit Bridge for Customs and Immigration formalities at a time not recorded.

1.1.3 After completion of the necessary formalities the aircraft departed from Beit Bridge at 1410 hrs. Information given to the Immigration authorities at Beit Bridge by the pilot before departure was to the effect that he had 3 passengers, was bound for Que Que which he estimated at 1610 hrs, had 3 hours endurance and intended to fly at Flight Level 75.

1.1.4 At 1543 hrs the Duty Air Traffic Controller at Fort Victoria aerodrome observed an aircraft, subsequently established as being ZS-EFM circling over Fort Victoria town. Attempts to contact the pilot on the Fort Victoria Approach frequency 125,5 MHz were unsuccessful and the aircraft positioned for an approach to Runway 35. The pilot was given the lamp signal for clear to land and he landed at 1553 hrs.

1.1.5 After landing the pilot came to the control tower and advised the Controller that he wanted to take on fuel and continue his flight to RISCO as his father was critically ill in Que Que hospital. He confirmed to the Controller that he had a valid night rating. He was told that there were no re-fuelling facilities and in any case the aerodrome was not open for night movements due to lack of suitable lighting. However emergency lighting is available in the form of a limited goose-neck flare path and the night take-off was approved by the Airport Manager under the circumstances.

1.1.6 The Controller then telephoned the RISCO Flying Club requesting arrangements be made for providing runway lighting for the aircraft to which they agreed. They also agreed to stay on at the aerodrome until the aircraft had landed in order to render any assistance the pilot may require. To aid the pilot they suggested he should fly to the Que Que NDB and when overhead take up a heading of 240° and hold this for four minutes as this would put him overhead RISCO aerodrome. This suggestion was duly put by the Controller to the pilot.

1.1.7 Regarding refuelling the pilot wanted to use motor fuel at which point the Controller suggested he should rather take on some AVGAS 100/130 there being a small supply at the aerodrome privately owned by a Dr. W. Warne. The pilot agreed to this and it was later established after dipping the drum that 85 litres had been drawn. A contamination and water check of the fuel was carried out the next day and it was found to be to specification.

1.1.8 After taking on fuel the pilot took off at 1628 hrs and was handed over to the Salisbury Flight Information Centre at 1630 hrs.

1.1.9 At 1646 hrs two-way radio communication was established between Salisbury Flight Information Centre and the aircraft on 125.1 MHz. At 1647 hrs the pilot reported that he had RISCO in sight which was acknowledged. Further attempts to contact the aircraft were made at 1731, 1732 and 1734 hrs but no reply was received. A copy of the transcript of the Air Traffic Control tape is at Appendix 1.

1.1.10 At 1720 hrs observers on the ground at RISCO aerodrome saw an aircraft approaching the aerodrome from the direction of Que Que, i.e. from the north-east. It appeared to join on a left base for runway 16 after which it turned left and flew immediately above the runway at about 600 ft. - 700 ft. AGL. At this time, in view of the pilot's unfamiliarity with the area, one of the observers on the ground considered it might be helpful to try to contact him on 118.7 MHz to advise that he was directly over the aerodrome. No reply was received on this frequency but a further call on 125.1 MHz resulted in a short unintelligible reply. Further details of radio frequencies in use in the Salisbury FIC are given in paras 1.9.2 and 1.9.3 of this report.

1.1.11 By this time the aircraft was abeam the hangar and in level flight. A further call was made on 125.1 MHz but no reply was received. Having flown some two-thirds of the runway length in a south-easterly direction the aircraft turned right and disappeared behind a range of hills which lie to the south-west and adjacent to the aerodrome. An observer on the ground who is an experienced pilot observed the aircraft's navigation lights moving in an erratic manner just prior to its disappearing behind the hills. A sketch of the probable flight path of the aircraft while flying in the RISCO area is at Appendix 2.

1.1.12 At approximately 1740 hrs a ground search was initiated by the ground observers and the vehicle proceeded in the general direction of the aircraft's estimated location. Nothing was seen and the party returned to the aerodrome. Two flying instructors from the RISCO Flying Club then took off in a club aircraft and carried out an air search of the area for 20 minutes. This search also produced no results. After landing the pilot advised the Salisbury Flight Information Centre of the negative results.

1.1.13 By this time the local police had arrived at the aerodrome and carried out a further ground search of the area and made telephone calls to farm owners, all with negative results. At midnight the search was called off due to the exceptionally dark conditions.

1.1.14 At 0450 hrs the following morning, 2nd October, 1975, the air search was resumed and at 0510 hrs the wreckage was located in a position 1,8 nm south-west of RISCO aerodrome. No sign of life could be seen and the aircraft had been completely destroyed.

1.1.15 At 0715 hrs the police proceeded to the scene by ground transport and it was confirmed on arrival that all four persons in the aircraft had been killed instantly on impact and the aircraft had been completely destroyed. The Department of Civil Aviation accident investigators arrived at the scene at 0815 hrs.

1.2 INJURIES TO PERSONS

Injuries	Crew	Passengers	Other
Fatal	1	3	-
Non-fatal	-	-	-
None	-	-	-

1.3 DAMAGE TO AIRCRAFT

1.3.1 The aircraft was destroyed on impact.

1.4 OTHER DAMAGE

1.4.1 There was no other damage.

1.5 CREW INFORMATION

1.5.1 The pilot, Mr. Fred van Niekerk, aged 33 years, was the holder of South African Private Pilot Licence No. 17544(P) issued on 15th February, 1973, and valid until 20th October, 1975. Aircraft types in the rating section of the licence were Cessna 150 series, Cessna 182 series and Cessna 210. A Night Flight rating was issued on 12th November, 1973. His last medical examination for licence renewal was assessed fit with no restrictions on 4th October, 1973.

1.5.2 Mr. van Niekerk commenced flying training on 15th September, 1971, and flew 28 hrs 20 minutes in Cessna 150 aircraft. He first flew solo after 16 hrs 05 mins dual instruction.

1.5.3 He commenced flying in Cessna 182 ZS-EFM on 3rd January, 1973, and flew this type solo for the first time after 6 hrs 50 mins dual instruction. He passed the Private Pilot flight test on 14th February, 1973, having at that time completed a total of 38 hrs 15 mins dual instruction and 15 hours solo. At the time of the accident his total recorded flight time on the Cessna 182 amounted to 426 hrs 50 mins.

1.5.4 Between 6th August, 1975 and 12th August, 1975 (the last recorded entry in his flying log book) he flew 2 hours dual instruction and 11 hrs 40 mins pilot-in-charge of Cessna 210 aircraft.

1.5.5 The total night flying recorded in his flying log book amounted to 2 hrs 05 mins. This consisted of 1 hr 35 mins on 29th October, 1973 and 30 mins on 30th October, 1973. Both flights were entered in the 'Dual' column of his log book but the name of the flying instructor(s) was not recorded. There is no evidence of his having carried out any night flying since these entries and this being the case his Night Flight rating was invalid in terms of Chapter 10.9D of the South African Air Navigation Regulations 1963 (as amended). To maintain the validity of this rating it is a requirement that the holder flies not less than 5 take-offs and 5 landings by night in the 90 day period immediately preceding the flight.

1.5.6 In terms of Chapter 10.13 of the same Regulations it is not permissible to act as pilot-in-command at night without a valid Night Flight rating.

1.6 AIRCRAFT INFORMATION

1.6.1 Aircraft ZS-EFM, a Cessna 182H Serial Number 18256-30, was manufactured in the United States of America by Cessna Aircraft Corporation.

1.6.2 The log book kept for this aircraft shows that an annual inspection in accordance with approved Maintenance Schedule GEN/1 had been carried out by Messrs. Techno Commander Sales/Maintenance (Pty) Ltd., Baragwanath Airport, for which Certificate of Safety Serial Number 192 dated 1st February, 1975, was issued, valid until 31st January, 1976.

1.6.3 The certificate of airworthiness for this aircraft was valid at the time of the accident.

1.6.4 No entries subsequent to that made for the annual inspection certified on 1st February, 1975, had been made in any of the three log books kept for this aircraft.

1.6.5 The Certificate of Safety dated 1st February, 1975, and the associated log book entry records that the annual inspection was carried out at 2088 flying hours or 1 hour earlier than the total flight time of 2089 hours on 27th December, 1974.

1.6.6 The figure of 2089 flying hours entered in the aircraft's log books against the date 27th December, 1974, is supported by corresponding flight time entries in the pilot's flying log book.

1.6.7 This entry does not serve to explain why the Certificate of Safety Serial No. 192 issued after an annual inspection at 2088 flying hours is dated 1st February, 1975, three calendar days before the expiry of the calendar time stipulated on the previous certificate, especially when according to the pilot's flying log book the aircraft had completed on that date an additional 15.30 hours or 2102.30 hours total time.

1.6.8 In order to establish as far as is reasonably practical from irregularly kept records the total flying hours completed by the aircraft at the time of the accident cognizance is taken of the flight time of 95.50 hours recorded in the pilot's log book from 28th December, 1974, until 6th August, 1975, assuming that the pilot, as the owner of the aircraft, was pilot-in-charge at all times.

1.6.9 It is estimated that the aircraft had completed 2189.45 flying hours at the time of the accident.

1.6.10 The engine, Continental O-470-R Constructor's Serial Number 1314464-5-R, was manufactured in the United States of America by Teledyne Continental Motors.

1.6.11 It had run 2089.00 hours since new and 596.25 hours since overhaul as at 27th December, 1974. It is estimated that it had at the time of accident completed about 697.10 hours since overhaul.

1.6.12 The propeller, McCauley model Number 2A34C-66 Serial Number 65761 was manufactured in the United States of America by the McCauley Industrial Corporation.

1.6.13 It had run 2089.00 hours since new as at 27th December, 1974, and it is estimated that at the time of the accident it had completed about 2189.45 hours total running time.

1.7 METEOROLOGICAL INFORMATION

1.7.1 Very shortly after the accident occurred an aircraft of the RISCO Flying Club with two experienced flying instructors on board took off in an attempt to locate the scene. Their report on the weather was that it was fine and clear with a very light south-easterly breeze (less than 5 knots). It was, however, a dark moonless night.

1.7.2 It is considered that the darkness of the night was a material factor in the accident in that it could lead to disorientation due to a lack of visual cues. This in turn could result in loss of control by a pilot inexperienced in night and instrument flight.

1.8 AIDS TO NAVIGATION

1.8.1 Not applicable.

1.9 COMMUNICATIONS

1.9.1 A copy of the transcript of the Air Traffic Control tape is at Appendix 1.

1.9.2 It is a Rhodesian requirement published in the Aeronautical Information Publication AGA 0-2 Section 3.1.3 that when operating at unmanned aerodromes a broadcast of position and intentions should be made on a frequency of 118,7 MHz. This broadcast should be made within a radius of 10 nm of destination and should not be transmitted when above 2 500 ft. above ground.

1.9.3 One of the flying instructors who subsequently took part in the air search that night attempted to contact the pilot on 118,7 MHz after the aircraft was observed in the area. This was unsuccessful and a further attempt to contact the pilot was made on the Salisbury FIC VHF frequency 125,1 MHz. This call resulted in a short, unintelligible reply. Both attempts to contact the pilot were made from an aircraft on the ground.

1.9.4 It is clear that the pilot was unaware of the requirement for the use of 118,7 MHz and was listening out on the FIC frequency on which the tape recordings at Appendix 1 were made.

1.10 AERODROME AND GROUND FACILITIES

1.10.1 RISCO aerodrome, position 19°02'S: 29°43'E is at an elevation of 3 975 ft. and has one bitumen runway of length 1 005 metres aligned 160°/340° (magnetic). It has electric runway lighting which is available on request but no lead-in or other lighting. It is a Private Licensed Aerodrome and prior permission is required for operation into it. There are no air traffic control facilities and its main users are the RISCO Flying Club and aircraft carrying passengers having business with the nearby steel manufacturing complex. There are no radio navigational facilities associated with the aerodrome but a non-directional radio beacon located on Que Que aerodrome (8 nautical miles distant on a magnetic bearing of 065° from RISCO aerodrome) operates on a continuous basis.

1.11 FLIGHT RECORDERS

1.11.1 No flight recorder was carried or was required to be carried.

1.12 WRECKAGE

1.12.1 Inspection of the scene of the accident showed that the aircraft had collided with the ground at an acute angle and had cartwheeled into a small hillock with the main wreckage coming to rest on the other side of it about 58 metres from the point of impact. The wreckage trail is shown at Appendix 3.

1.12.2 The mainplanes and the engine were detached during the gyration of the aircraft.

1.12.3 Examination of the wreckage did not reveal any in-flight defects. All structural and control surface damage resulted from its collision with the ground and as it cartwheeled to rest.

1.12.4 The mechanical condition of the engine, although substantially damaged, does not suggest or support its probable failure as the cause of the accident. It was running on power immediately before impact.

1.12.5 The propeller hub had split on impact and the two blades had become detached. One blade was located just forward of the point of impact, and the second blade was located 90 metres to the right of the main wreckage and 107 metres from the point of impact.

1.12.6 The propeller hub was located near the almost bare engine which came to rest 20 metres past the main wreckage. The engine crankshaft flange which was bent at about 15° still retained the propeller attachment studs and their respective nuts. These studs had fractured in shear.

1.12.7 The damage to the front of the engine and its sump supports the opinion that the aircraft collided with the ground at an acute angle.

1.12.8 The mainplanes had become detached as the aircraft cartwheeled to rest. The substantially damaged right mainplane with its wing strut attached was located upside down to the right and forward of the main wreckage, while the left mainplane was located right side up and to the left of and past the main wreckage. All control surfaces were attached to their respective main surfaces and although the substantial damage sustained by the cabin area precluded the establishment of the correct routeing of control cables in the fuselage, no mechanical failure other than that sustained during impact was found which would suggest or support that any of the control cable runs between the control surfaces and foot and hand controls had failed in flight.

1.12.9 The rear fuselage and empennage was found almost free of damage. The elevator trim tab was found in the full nose down position, and although the probability of it running to this position as the aircraft disintegrated cannot be ignored, it is nevertheless apparent that this would not occur where the operating cables remained intact. It therefore seems most likely that the trim was run to this position at some time during the latter part of the flight and before the aircraft collided with the ground.

1.12.10 The cabin area, out of which the occupants had been ejected, when examined, showed that the crumpled structure, together with instrument panel and hand and foot controls, held the engine carburettor and induction pipes and portion of the cowl and exhaust system. The exhaust muffler was located just forward of the wreckage.

The engine mounting frame and engine accessories, too, were located in this area.

1.13 FIRE

1.13.1 Fire did not occur.

1.14 SURVIVAL ASPECTS

1.14.1 This was a non-survivable accident.

1.15 TESTS AND RESEARCH

1.15.1 No tests or research were considered necessary.

2. ANALYSIS AND CONCLUSIONS

2.1 ANALYSIS

2.1.1 On the log book evidence available to the investigators the pilot was not correctly licensed for the flight in that his night flight rating was not valid in terms of Chapter 10.9D of the South African Air Navigation Regulations, 1963.

2.1.2 The pilot had not previously operated into RISCO aerodrome and would have been unfamiliar with its layout and the local topography.

2.1.3 Although the weather conditions at the time of his arrival at RISCO were fine with very light winds it was a very dark night and once having passed the lighted areas of Que Que and Risco townships his visual cues would have been practically nil and he would have been reliant upon his flight instruments to maintain control of the aircraft.

2.1.4 His last recorded instrument flying was on 30th August, 1973, and his last recorded night flying was on 30th October, 1973. His total recorded instrument flying amounts to 5 hrs 05 mins and night flying to 2 hrs 05 mins.

2.1.5 The pilot had very limited instrument and night flying experience and had not, according to his log book entries, carried out either type of flying for some two years. It follows therefore that he was not in practice for the type of flying he carried out immediately prior to the accident.

2.1.6 The observation made to the effect that the aircraft's navigation lights were moving in an erratic manner just prior to its disappearing from sight in the area in which the wreckage was discovered, coupled with the fact that he would have had practically no visual cues on the last observed heading, plus his being out of practice at both instrument and night flying, all point to the fact that at this time he did not have full control over the aircraft. This is confirmed by the attitude of the aircraft on impact with the ground.

2.2 CONCLUSIONS

2.2.1 The pilot was licensed to fly the Cessna 182 and had a reasonable amount of visual flight experience on type. He had qualified for a Night Flight rating in terms of the South African Air Navigation Regulations but had no recorded experience of either night or instrument flying for nearly two years. He was not therefore in practice at either type of flying.

2.2.2 The estimated weight and Centre of Gravity position were within permissible limits.

2.2.3 The aircraft was in a serviceable condition prior to the accident and although the log books had not been kept regularly all mandatory checks and inspections had been carried out.

2.2.4 The weather conditions at the time were such that having lost sight of the lighted areas of Que Que and RISCO the pilot would have had little or no visual reference and would have been reliant upon the flight instruments for orientation.

2.2.5 The pilot was not familiar with the aerodrome or its surrounds and characteristics as he had not previously operated into this aerodrome.

2.2.6 An expert witness observation was made which leads to the conclusion that the aircraft was not fully under control during the stage of flight just prior to the accident (see para. 2.1.6). The attitude of the aircraft on impact confirms that it was not under control at the time.

2.2.7 The altimeter was recovered from the wreckage and showed a reading of 3 980 ft. This confirms that an approximately correct setting had been made as the aerodrome elevation is 3 975 ft.

2.3 CAUSE

2.3.1 The most probable cause of the accident was a loss of control due to disorientation while night flying in an unfamiliar area in conditions of visibility which demanded skills in which he was not in current practice.