

CAV/ACC/5/70

ACCIDENT INVESTIGATION BRANCH

CIVIL AIRCRAFT ACCIDENT

Report on the accident to Cessna 177
Aircraft Registration 5Y-AHT which
occurred on the 1st February, 1970
at Ziwandu, Northern extremity of
the Selous Game Reserve,
Tanzania.

E A S T A F R I C A N C O M M U N I T Y

ACCIDENT REPORT
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Civil Aircraft Accident Report No. CAV/ACC/5/70

AIRCRAFT: Cessna 177, 5Y-AHT. ENGINE: Lycoming O-320-E2D
REGISTERED OWNER AND OPERATOR : P.J. Mawji and Credit Finance Corporation,
P.O. Box 2161, Dar es Salaam, Tanzania.
PILOT: Mr. G.W. Harper - Uninjured.
PASSENGERS: Three - Uninjured.
PLACE OF ACCIDENT: Ziwandu, Northern extremity of the Selous
Game Reserve, Tanzania.
DATE AND TIME: 1st February, 1970 at approximately 1300 hours.

ALL TIMES IN THIS REPORT ARE G.M.T.

S U M M A R Y

The aircraft had completed a private flight from Dar es Salaam to Ziwandu. The landing at Ziwandu was without incident, and after a period of about three hours a take-off was attempted for the return flight to Dar es Salaam.

The take-off was influenced by the ground conditions of the airfield and these caused the pilot to abandon the take-off after becoming airborne.

The aircraft over-ran the runway and overshoot area, and entered the scrub and trees approximately 150 yards from the end of the runway. The aircraft was extensively damaged but no injuries were incurred. There was no fire.

1. INVESTIGATION

1.1. History of the flight

The history of the flight on which the take-off was abandoned would be incomplete without examination of the details of the flight which positioned the aircraft at Ziwandu. Certain factors and observations were made prior to landing at Ziwandu which warranted consideration prior to further take-off.

Mr. Harper filed a V.F.R. Flight Plan for a private flight from Dar es Salaam to Ziwandu on 1st February, 1970. The flying time from Dar es Salaam to Ziwandu was approximately 55 minutes and the flight was without incident.

Arriving overhead Ziwandu, the pilot twice circled the landing ground to assess landing conditions, and finally made a low pass at about fifty feet above ground level to make a more accurate assessment of field conditions and to ensure that the area was clear of game.

This survey was carried out by the pilot because of recent heavy rains and general flooding in the area. There had, however, been no rain in the preceding two days.

Having assessed the landing ground as being fit for use the pilot then made a landing without incident.

Some three hours later the pilot made a further assessment of the airstrip prior to take-off. The survey was made initially in a vehicle and then later on foot. The ultimate assessment by the pilot was that the airstrip was fit for use. Having loaded passengers and baggage the take-off was then commenced from a position of approximately fifty yards from the take-off end of the runway bearing 080 degrees. It appeared impracticable to make use of the full length of the runway due to wet ground.

Three patches of wet ground were encountered during the take off run which retarded the aircraft speed. At about 40 yards from the end of the runway the airspeed was approaching 75 miles per hour, and rising steadily. The pilot then rotated the aircraft which became airborne to a height of four to five feet above ground level. The aircraft then, in the opinion of the pilot, appeared to be sinking, and in order not to fly into trees at the end of the runway, the take-off was abandoned by closing the throttle, switching off the ignition, and making a straight ahead landing.

The aircraft entered the bush and trees at the end of the runway overshoot area, tearing off the wings and collapsing the nose strut.

The aircraft was evacuated without incident or injury to pilot or passengers beyond minor bruising.

1.2.

Injuries to Passengers

Injuries	Crew	Passengers	Others
Fatal	-	-	-
Non-Fatal	-	-	-
None	4	3	

1.3. Damage to Aircraft

On impact, the wings, including the main spar assembly were completely torn away from the fuselage. Extensive fuselage damage was incurred in the cabin and aft cabin area. The fuselage and wings can be considered beyond repair.

The nose wheel strut was torn away from the front fuselage fittings, but the main landing gear appears to have suffered little damage. The engine and propeller were relatively undamaged, as at the time of the impact the engine was stopped with the propeller in a near horizontal position.

The tail section of the aircraft suffered relatively minor damage.

Summing up, the aircraft is beyond repair but with salvage value.

1.4. Other Damage

None.

1.5. Crew Information

The Pilot, Graham Hartridge Harper, aged 28 years, is the holder of East African Commercial Pilot's Licence No. 1021(T.89), issued in July, 1969, valid until 1st April, 1970, and rated for Cessna 150 in Group 1. Mr. Harper also holds a Flight R.T. Operator's Licence No. 1839(K.1330) in line with the C.P.L. described above. Additionally Mr. Harper holds an Assistant Instructor's Rating valid until 25th May, 1970, for Cessna 150 aircraft.

In relation to the accident flight, this was of a private nature, and as such, Mr. Harper was exercising the privileges of his Private Pilot's Licence.

At the time of the accident Mr. Harper had a total of some 855 hours in command of which seven to eight hours were on the Cessna 177.

1.6. Aircraft Information

The aircraft, a Cessna 177 Cardinal, Serial No. 177-01162 and powered by one Lycoming O-320 engine, was constructed by the Cessna Aircraft Company, Wichita, United States of America, in 1968.

The aircraft arrived in East Africa in possession of FAA Certificate of Airworthiness for Export No. E.88103 dated 7th March, 1968. The aircraft was first registered in the name of Safari Air Services, P.O. Box 1951, Nairobi on the 28th May, 1968. A subsequent re-registration in the name of P.J. Mawji and Credit Finance Corporation of P.O. Box 2161, Dar es Salaam, was made on 18th September, 1968. No further change of ownership has been registered since this date.

The East African Certificate of Airworthiness in the Private Category was issued on the 18th September, 1968. This Certificate was renewed on the 30th September, 1969, valid until the 29th September, 1970.

At the time of the accident the aircraft had flown a total of 314 hours 10 minutes. The engine hours were identical with those of the airframe.

The aircraft has been maintained during the whole of its time in East Africa to the Manufacturer's Recommendations. This type of maintenance is acceptable for aircraft in the Private Category.

In August, 1969, this aircraft was involved in a minor accident which was rectified and properly certified. This previous accident has no significance in the accident under investigation.

The calculations of all up weight and centre of gravity for the accident flight were within the authorised limits for aircraft operation.

1.7. Meteorological Information

Weather conditions at the time of the accident were reported as good, with ground temperatures of approximately plus 29° Centigrade. Wind strength was steady at between 10 and 15 knots from approximately 070 degrees.

1.8. Aids to Navigation

Not applicable to this report.

1.9. Communications

Not applicable to this report.

1.10. Aerodrome and Ground Facilities

The landing ground at Ziwandu is within the Selous Game Reserve. The Game Department do not accept liability for maintaining the strip which was engineered by Mr. Palmer-Williams, the operator of a near-by Game Lodge.

The airstrip is not licensed, neither is it notified as a Government Airfield.

The runway which is at an elevation of approximately 425 feet above sea level, is a little over 750 yards in length and approximately 18 yards in width. The surface is grass/earth and there is no decided slope except for the overshoot area at the end of the runway bearing 080. The runway has no boundary markings and the sides of the runway are indicated only by slight earth mounds resulting from the use of a surface grader.

On examination of the runway surface on the day following the accident, the following observations were made. There had been no rain between the time of the accident and the runway inspection.

From the commencement of the runway bearing 080 there was a strip of firm ground extending for a distance of approximately 220 yards. The runway was then traversed by a patch of mud and water which extended for fifteen yards. The depth of mud and water was approximately four inches, but the surface below the mud appeared reasonably firm. 130 yards further down the runway was another patch of mud and water of approximately 2½ inches in depth. This patch extended to some 15 yards in width. Minor water and mud patches existed at the runway edges, but the centre of the runway was then firm for a distance of 240 yards, at which point a further mud and water patch extended across the runway. This third patch was approximately 10 yards in width and at a depth of 1½ inches. The remaining 140 yards of runway appeared dry and firm.

At the time of the investigation the wet patch of ground at the commencement of runway 080, which necessitated the pilot starting his take-off run 50 yards from the beginning of the runway, could not be established. However, there is no reason to believe that this patch did not exist, but accepting that this area had dried out in the interim period, it would indicate that the three mud and water areas referred to above, were at a greater depth at the time of the accident than when the survey was carried out.

A not-to-scale diagrammatic representation of the landing ground is included as Appendix 'A' to this report.

At the up wind end of runway 080 the overshoot area has a decided down slope. The total overshoot area is about 150 yards in length and is bounded by trees growing to a height of approximately 45 feet. Because of the down-slope the tops of the trees are about 15 feet above the level of the runway.

1.11. Flight Recorder

No flight recorder was fitted or required to be fitted.

1.12. The Wreckage

See Paragraph 1.3. (Damage to Aircraft) of this report.

1.13. Fire

There was no fire.

1.14. Survival Aspects.

At the time of take-off and the subsequent impact the pilot and passengers were strapped into their respective seats and no injuries apart from minor bruises were sustained.

1.15. Tests and Research

Physical examination of aircraft and landing strip.

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2. ANALYSIS AND CONCLUSIONS

2.1. Analysis

From the take-off data supplied in the Owner's Manual, it would seem that ample runway was available for the take-off in order to clear a 50 foot obstacle at the weight, temperature and altitude conditions prevailing at the time.

However the retarding effect of the first, second and marginally of the third wet patch areas effectively reduced the acceleration available distance by almost 300 yards.

The possibility that the aircraft started to sink after gaining an altitude of some 4 to 5 feet above runway level cannot be ruled out, and could be partially explained by the variation in ground contours in the overshoot area, and the variation in temperature between the exposed runway surface and the area shaded by trees. However, this effect would be only marginal when compared to the major effect of speed retardation through the three wet patch areas encountered on the runway.

Had the pilot decided to abandon the take-off after the retarding effect of the second wet patch area, there would have remained a distance of some 320 yards in which to bring the aircraft to a stop.

The decision to abandon the take off was in fact made after the aircraft became airborne, with only 40 yards of runway, plus overshoot area, remaining.

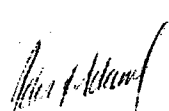
2.2. Conclusions

(a) Findings

- (i) The documentation of the aircraft was in order.
- (ii) The aircraft had been properly maintained.
- (iii) The all-up-weight and centre of gravity were within the authorised limits.
- (iv) The pilot was properly licensed.
- (v) The airfield conditions were too marginal to ensure a satisfactory take-off run.

(b) Probable Cause.

The accident was caused by a late decision to abandon the take-off following a take-off run carried out under marginal ground conditions.



P. J. Adams
INSPECTOR OF ACCIDENTS

APPENDIX A
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