

**MINISTRY OF COMMUNICATION AND TRANSPORT
ACCIDENT INVESTIGATION BRANCH**

CIVIL ACCIDENT NO. CAV/ACC/7/98

**REPORT ON THE ACCIDENT TO CESSNA 150G AIRCRAFT REGISTRATION
ZS-ENR WHICH OCCURRED ON 28 MARCH, 1998 AT MBEYA AIRPORT,
TANZANIA (08 55 S 033 27E)**

Kumb. **Wizara** **CTC/A.10/3**
DCA **CAV/ACC/7/98**

KWA: **Waziri (W/MU)**
 Naibu Waziri (W/MU)

KUPITIA KWA: **Katibu Mkuu**
 Wizara ya Mawasiliano na Uchukuzi
 S.L.P. 9144
 DAR ES SALAAM

KUTOKA KWA: **Mkurugenzi Mkuu**
 Idara ya Usalama wa Anga

TAREHE: **22 December, 1998**

**MUHTASARI WA AJALI YA NDEGE NO. ZS-ENR ILIYOTOKEA
KATIKA UWANJA WA NDEGE WA MBEYA TAREHE 28 MACHI, 1998**

Ndege hii ambayo ina injini moja na uwezo wa kubeba watu wawili iliwasili Mbeya tarehe 28.3.1998 saa 5.15 asubuhi ikitokea Afrika ya Kusini. Ilikuwa ikielekea Uswisi kupitia Nairobi.

Alikuwemo rubani mmoja pamoja na abiria mmoja. Baada ya kujaza mafuta hapo Mbeya ndege ZS-ENR iliomba na kupewa ruhusa ya kuondoka Mbeya. Mara tu baada ya kuruka, ilishindwa kupaa zaidi ya futi 30, ndipo rubani alipoamua kutua kwa dharura kwenye uwanja wa shule uliokuwa meta 200 kutoka mwisho wa uwanja wa ndege.

Rubani alifanikiwa kutua kwenye uwanja wa michezo wa shule na mara tu baada ya kutua ndege ilisimama katika shamba la mahindi lililokuwa mwishoni mwa uwanja huo.

Abiria pamoja na rubani walinusurika. Ndege pia haikuharibika wala haikugonga mtoto yeyote kati ya watoto waliokuwa wakicheza katika uwanja wa shule.

Utafiti umeonyesha kwamba ndege hii ilishindwa kupaa angani mara tu baada ya kuruka kwa sababu ya kubeba mizigo mizito kuliko uwezo wake.

Ripoti hii inawasilishwa kwa Waziri aamue kwa kufuatana na kifungu cha sheria ndogo ya uchunguzi wa ajali za ndege (Civil Aviation Act, Investigation of Accidents) No. 8 (3) inayosema "The Minister may cause the whole or any part of such a report to be made public in such a manner as he thinks fit".

Kwa maoni yetu ripoti haina usiri na Waziri akiruhusu itatolewa wazi (be made public).

Nawasilisha.

Margareth Munyagi
MKURUGENZI MKUU

* Nakala ya Ripoti ya Ajali inaambatanishwa.

**TANZANIA ACCIDENT INVESTIGATION BRANCH
AIRCRAFT ACCIDENT REPORT NO. CAV/ACC/7/98**

Aircraft type : Cessna 150G

Nationality : South African

Registration Marks : ZS-ENR

Engines : One Continental 0-200-A (100 HP)

Registered Owner : R.F. Vitins
145 Berea Street, Sunnyside, Pretoria, RSA

Operator : Same as registered owner

Pilot : One - Uninjured.

Others : Nil

Place of Accident : Nil

Date : 28 March, 1998

Time : 1124 hours.

ALL TIMES IN THIS REPORT ARE UTC

SYNOPSIS

The aircraft took off from Mbeya Airport for a flight to Iringa. It was carrying full fuel, one pilot and one passenger. The pilot said that after he had taken off from runway 13 the aircraft failed to climb beyond 30 feet above ground level and it became certain that he could not clear some trees which were located 500 feet beyond the end of the runway. He therefore decided to land on a school playground which was in front of him. ZS-ENR touched down and rolled on the playground and came to rest about 30 metres inside a corn farm. There were no injuries to the occupants and the children who were playing in the area. The aircraft sustained no damage.

It is concluded that given the temperature of the day and the elevation of the airfield, the passengers, fuel and baggage carried on the aircraft amounted to overload.

1. FACTUAL INFORMATION

1.1 History of the Flight:

The aircraft was on a ferry flight from Capetown, Republic of South Africa to Zurich, Switzerland via Nairobi, Kenya. It arrived in Mbeya at 0815 hours having flown from Kasama, Zambia. There were two occupants including the pilot and one passenger. The pilot refuelled the aircraft to full tanks (26 gallons) and the party boarded the aircraft for take-off for Iringa. They were carrying some baggage of two rucksacks, food and two fuel jerry cans, one of which was empty and the other was half full. The aircraft weight at the time of take-off was estimated at 1569 lb (the maximum allowed take off weight is 1600 lb).

Take-off was initiated at 1122 hours. The pilot said that he had run the engine at full power before releasing the brakes at the threshold of runway 13. The aircraft rolled for 500 metres before it became airborne and, "as expected", it climbed poorly. By the time it came to the end of the runway (which was 1550 metres long) it had risen to about 30/40 feet above ground level and did not seem to climb further. Realising that there were tall trees 250 metres further ahead, the pilot throttled back to idle and touched down on a school playground as shown in Appendix 1. After rolling about 60 metres the aircraft ploughed into a corn (maize) field where it came to rest.

There was no damage to the aircraft and the occupants were not injured. The aircraft was reported to have missed some children who were playing football on the school playground.

1.2 Injuries to persons:

Injuries	Crew	Passengers	Others
Fatal	-	-	-
Serious	-	-	-
None	1	1	-

1.3 Damage to aircraft:

The aircraft was not damaged

1.4 Other damage:

Some maize crop was damaged.

1.5 Flight crew information:

The pilot, Capt. Rato Florian Vitins was born at George in Switzerland on 12 September, 1974. He held a current South African PPL No. PA 43379 issued on 9 July 1997.

His total flying experience was 127.2 hours on which 109.7 were on the Cessna 150.

1.6 Aircraft information:

The aircraft, a Cessna 150G serial No. 65230 powered by one 100 hp Continental 0-200-A engine was manufactured by the Cessna Aircraft Company at Wichita, Kansas, USA in 1967.

It was registered ZS-ENR in the name of Vitins RF, 145 Berea Street, Sunnyside, Pretoria 0002 on 2 February, 1998. A certificate of registration No. 2852/16 was issued.

A Certificate of Airworthiness No. 2952/5 was issued on 26 January, 1998. By the time of the accident the C of A was current.

1.6.1 Loading and C of G disposition:

Whilst at Mbeya the pilot refuelled the aircraft to full tanks (26 US gallons). Each of the two occupants was carrying some baggage in a rucksack as well as food in separate containers. There were also two fuel jerry cans, one of which was empty and the other was half full.

The aircraft weight at the time of take off from Mbeya was therefore estimated as follows:-

	lb
Aircraft empty weight (standard fuel tanks)	975
Buggage:2 rucksacks and food containers	60
Fuel:26 gallons (in tanks) @ 6lb	156
Half a jerry can 15lb	15
Pilot: 85 kg	187
Passenger: 75 kg	165
Oil:	11

Take-off weight	1569
Maximum allowed take-off weight	1600

1.7 Meteorological information:

The Commander obtained weather information from the Mbeya Tower shortly before departure for Iringa. The wind was 090 at 10kt which favoured runway 13. The temperature was 20°C. Visibility was unlimited.

1.8 Aids to Navigation:

Not applicable.

1.9 Communications:

After startup ZS-ENR requested taxiing clearance at 1120 hours. The clearance was given as well as the weather information. The active runway was 13.

At 1123 hours the pilot reported ready for departure and take off clearance was given. Subsequent to this the aircraft started rolling for take-off.

There was no further communication between the aircraft and the Tower. However, the duty controller saw the aircraft force-landing beyond the end of the runway and sounded the alarm.

1.10 Aerodrome information:

Mbeya airport, elevation 5500 feet (1,676m) has one runway (13/31) which is 1,550 metres (5,085 ft) long and 30 m (98 ft) wide. The surface is grass (and is rough).

There are buildings erected just beyond the edges of the runway. There are also a number of foot paths and roads criss-crossing the runway. At any one time there are people crossing the runway and sometimes animals graze on the runway.

1.11 Flight recorders:

Not required by regulations. None fitted.

1.12 Wreckage and impact information:

The aircraft made a successful force-landing on a school playground and stopped inside a corn field about 300 metres beyond the end of the runway 13. The aircraft was not damaged.

1.13 Medical and pathological information:

Not applicable.

1.14 Fire:

There was no fire.

1.15 Survival aspects:

The aircraft landed on a school playground located 200 metres beyond the end of the runway. There were reports of the aircraft having missed some children who were playing on the school playground when it force-landed. However, the children were not injured.

The area beyond the end of runway 13 had not been invaded by builders some of whom had erected tall buildings just beyond the edges of the runway. If this area had been built up, the aircraft would probably have collided with the structures.

1.16 Tests and Research:

It was at first suspected that the pilot had not leaned properly the mixtures before take-off was initiated. For this reason it was decided to lean the mixture, run the engine to full power with brakes on before take-off roll.

This was made and the aircraft, with two on board covered 500 metres before lift off. When it failed to climb beyond 30 feet, it was landed within the remaining length of the runway.

It therefore became apparent that the effects of density altitude were a significant factor in the poor performance of this aircraft.

When take-off was attempted with only one person on board the aircraft took off and climbed without any problem.

1.17 Additional information:

The effects of density altitude represent a potentially serious source of danger to aircraft operations.

The Directorate of Civil Aviation in January 1991 issued an Aeronautical Information Circular No. 3/91 cautioning pilots to be vigilant on aircraft take-off performance in relation to weight of the aircraft, aerodrome elevation and temperature. The circular is attached as Appendix 2 to this report.

2. ANALYSIS

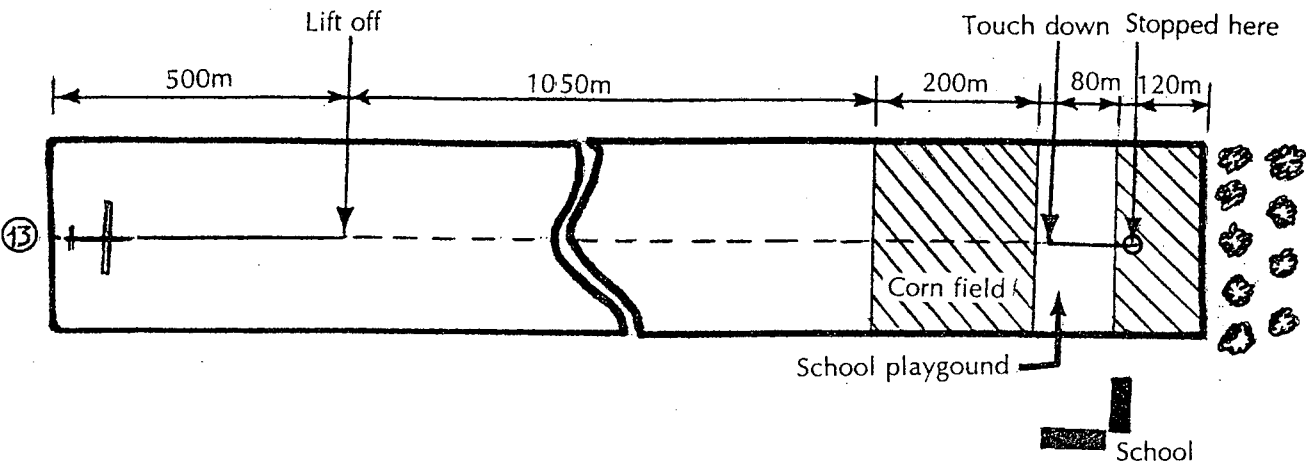
It was established in the course of the investigation that there were no defects in the aircraft which could have contributed to the accident.

The aircraft which was being operated at near full load rolled for 500 metres before take-off and failed to climb beyond 30 feet above the ground. However, when take-off was attempted at a reduced weight, the aircraft made a successful climb out. The elevation of the airfield was 5500 feet and the temperature was 20°C (68°F).

Since the engine was found to develop full power and the mixtures were properly leaned before the second take off from Mbeya, it became apparent that density altitude was a very significant factor in the performance of this aircraft. The high elevation of the airfield (5500 feet) and the relatively high temperature (20°C) did not allow the aircraft to climb at near gross weight. However, a reduction of 180 lb in the aircraft take-off weight made it possible for the aircraft to achieve a safe climb out of Mbeya airfield

APPENDIX 1

MBEYA RUNWAY AND ACCIDENT SITE



APPENDIX 2

AIC NO. 3/91

THE UNITED REPUBLIC OF TANZANIA
MINISTRY OF COMMUNICATIONS AND TRANSPORT
DIRECTORATE OF CIVIL AVIATION

DCA 8220

1 January 1991

Aeronautical Information Service

P.O. Box 2819
Dar es Salaam

TAKE OFF PERFORMANCE OF LIGHT AIRCRAFT

1. Pilots are reminded that it is their role responsibility to ensure that the field length is adequate to permit a take-off to be completed in safety and that no external pressures must be allowed to influence their judgement in such matters.
2. The most important principles affecting the take-off performance are the "W.A.T." factors, viz:-
 - (a) Weight of the aircraft.
 - (b) Altitude of the aerodrome or strip (field elevation above mean sea level), and
 - (c) Temperature.
3. However, other criteria affecting the take-off distance required must also be taken into account when making an assessment of the take-off run required and the ability to clear a 50 foot screen on the net flight path. Amongst the most important of those are:-
 - (d) Surface wind direction and speed.
 - (e) Runway gradient (uphill or downhill).
 - (f) Engine power output.
 - (g) Runway conditions-wet, dry, loose, gravel or sand, pools of standing water, thick grass, etc. etc.
 - (h) Obstructions in the net flight path; and
 - (i) Pilot handling technique.
4. Pilots are urged to take into consideration all such factors before every take-off and to make a practice of referring to the performance information provided in the aircraft Flight Manual whenever the take-off distance available is considered to be marginal. Under the circumstances should a take-off be attempted if there is any doubt as to the aircraft's ability to become safely airborne within the take-off distance available, due account being taken of any obstructions in the net flight path.
5. Pilots are further reminded that the take-off distance available (including over run) must be sufficient to allow the take-off to a predetermined speed (or decision (V_1 , speed)) : to abort the take-off up to that point and to decelerate safely within the overall distance available, including over-run.