

<b>AIRCRAFT ACCIDENT SHORT REPORT</b>
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**CA18/2/3/9822:** Unstable approach that led to a deep landing and a rotation prior to reaching the take-off speed during a touch-and-go exercise, culminating in a crash.

<b>Date and time</b>	: 22 September 2019; 0455Z
<b>Occurrence type</b>	: Accident
<b>Aircraft registration</b>	: ZU-EHS
<b>Aircraft manufacturer and model</b>	: ICP Italy & Savannah Africa, Oribi
<b>Last point of departure</b>	: Hazyview/Numbi Airfield
<b>Next point of intended landing</b>	: Graskop Airfield
<b>Location of incident site with reference to easily defined geographical points (GPS readings if possible)</b>	: 26°20'54.65" S 027°46'41.62" E, on Runway 16 at Graskop Airfield
<b>Meteorological information</b>	: Wind: 220°/04 kt; Temperature: 22°C; Dew point: 7°C; QNH: 1016 hPa; CAVOK
<b>Type of operation</b>	: Private (Part 94)
<b>Persons on-board</b>	: 1+1
<b>Injuries</b>	: Serious injuries
<b>Damage to aircraft</b>	: Destroyed

*All times given in this report are Co-ordinated Universal Time (UTC) and will be denoted by (Z). South African Standard Time is UTC plus 2 hours.*

**Purpose of the Investigation:**

*In terms of Regulation 12.03.1 of the Civil Aviation Regulations (2011), this report was compiled in the interest of the promotion of aviation safety and the reduction of the risk of aviation accidents or incidents and **not to apportion blame or liability**.*

**Disclaimer:**

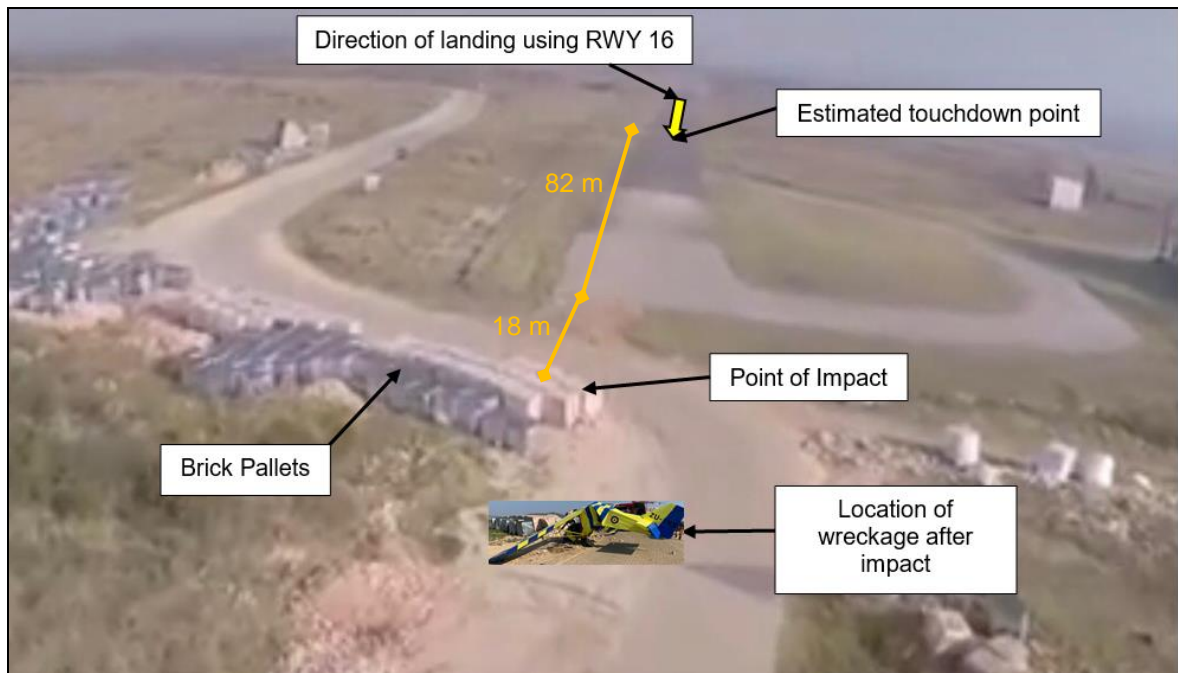
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## 1. SYNOPSIS

- 1.1. On Sunday 22 September 2019, at 0410Z, a pilot and a passenger departed Hazyview Airfield in a Savannah Africa Oribi aircraft on a flight to Graskop Airfield, where the pilot was to participate in the MISASA Numbi Africa Cup 2019.
- 1.2. The pilot stated that during the race at Graskop Airfield, the aircraft approached Runway 16 (RWY 16) to carry out a touch-and-go exercise on a touch-down box used by all participants. During landing, the pilot landed too deep to avoid potholes on the runway. The aircraft touched down with the main landing gear and he kept the nose gear elevated to avoid damage that was likely to be caused by potholes.
- 1.3. The pilot reported that subsequent to touching down and applying full power for take-off, the aircraft became airborne but could not gain height; the aircraft then crashed into a pallet of bricks that were situated along the extended centreline of RWY 16, approximately 100 metres (m) from the threshold of RWY 34.
- 1.4. The aircraft was destroyed; the pilot and the passenger sustained serious injuries as a result of the accident.
- 1.5. The investigation revealed that the aircraft's approach was high, resulting in a deep landing and touch down at approximately 750m from the threshold of RWY 16. As a result, the aircraft had less than 100m left on the runway for take-off. The pilot then rotated the aircraft prior to reaching its rotation speed and the aircraft could not climb. The aircraft, thus, impacted pallets of bricks placed on the extended centreline of the runway.

## 2. FACTUAL INFORMATION

- 2.1. On 22 September 2019, at 0410Z, a pilot and a passenger departed Hazyview Airfield on a flight to Graskop Airfield to participate in the MISASA Numbi Africa Cup 2019. The flight was conducted in accordance with Part 94 of the Civil Aviation Regulations (CAR) 2011 as amended.
  - 2.1.1. The MISASA Numbi Africa Cup is an annual microlight event held at the Hotel Numbi, Hazyview, South Africa. The event has no entry fee and aims to encourage the sport of recreational flying and is specifically aimed at inexperienced pilots.
  - 2.1.2. For the Africa Cup 2019, 11 microlights, four light sport aircraft and two gyrocopters participated in the event. The competition consisted of navigation and runway tasks. The runway tasks consisted of a timed circuit, spot landings, a flour bomb drop and ribbon cutting (bog roll) exercises.
- 2.2. The race co-ordinator prepared and inspected a designated touch-down box (landing deck) for power touch-and-go exercises on the runway at approximately 300m from the threshold of RWY 16 and approximately 500m from the threshold of RWY 34.
- 2.3. The race co-ordinator reported that after the first aircraft landed downwind on RWY 34, the pilot of that aircraft advised other fellow pilots via transmission on radio frequency 124.8 megahertz (MHz) to land towards the mountains, heading 160°.
- 2.4. At about 0455Z, the race co-ordinator witnessed ZU-EHS approach and carry out a touch-and-go exercise on RWY 16 and, later, saw it struggle to gain height. The aircraft then crashed following an impact with pallets of bricks which were approximately 1 metre (3 feet) high and were positioned across the road from the end of RWY 16, approximately 100m from the threshold of RWY 34.
- 2.5. The aircraft (ZU-EHS) was the sixth aircraft to perform a touch-and-go exercise on RWY 16. The pilot reported that the aircraft landed too deep, approximately 750m on the runway which was 850m long, due to potholes. Therefore, the aircraft did not land on the allocated touch-down box allocated by the race co-ordinator.



**Figure 1:** Location of accident site superimposed on Google Earth.

- 2.6. The pilot reported that subsequent to touch down at a speed of 60 miles per hour (mph) and, thereafter, applying full power for take-off, the aircraft became airborne but could not gain height. The aircraft then collided with pallets of bricks that were situated at the end of RWY 16, approximately 100m from the threshold of RWY 34.



**Figure 2:** The aircraft post-accident. (Source: Operator)

- 2.7. The pilot was air-lifted to a hospital in Nelspruit while the passenger was transported by road ambulance to the same hospital. The aircraft was destroyed after the accident sequence, and the pilot and the passenger sustained serious injuries.
- 2.8. The flight was conducted in visual meteorological conditions (VMC) by day with fine weather conditions prevailing at the time of the accident.
- 2.9. Runway 16 at Graskop Airfield is 850 metres (m) long and 10m wide, with an elevation of 4921ft above mean sea level (AMSL). The location of the accident was at the following GPS co-ordinates: 26°20'54.65" S 027°46'41.62" E. The runway is a prepared tar surface with a positive slope of 3.1°.
- 2.10. The meteorological aerodrome report (METAR) for Air Force Base Hoedspruit (FAHS) which is 57 nautical miles (nm) to the north of Graskop Airfield at the time of the accident was – Wind: 140°/4kt, Temperature: 19°C, Dew point: 11°C, QNH: 1016 hPa and Visibility: CAVOK. The Terminal Aerodrome Forecast (TAF) for Hoedspruit showed weak winds throughout the day.

- 2.11. The normal procedures provided in the Savannah Flight Manual for Take-off and Climb for Short Take-off are as follows:

<b>SHORT TAKE OFF</b>	
Flaps, 40°	SET
Brakes	FULLY APPLIED
Throttle	FULLY OPENED
Air-box control	COMPLETELY PUSHED FOR COLD AIR
Brakes	RELEASED
Pilot's heels	ON THE FLOOR
Nose-up attitude, control stick pulled-on until taking off	SET AND HOLD
Climb airspeed at 45 mph until the 50 ft obstacle clearing	SET
Flaps, upon reaching a safe altitude and airspeed	FULLY RETRACTED

NOTES:

- the best rate of climb makes the aircraft climb to the required altitude in the shortest flight time;
- the best angle of climb makes the aircraft climb to the required altitude in the shortest distance;
- in normal flight conditions, set the flaps to 20° to shorten the take-off roll in order to clear a 50 ft. high obstacle. That's possible since the aircraft flies at a lower airspeed but the extended flaps decrease the rate of climb.
- in case of operation from high elevation airfields and/or at high ambient temperature the extended flaps induced drag increase affects the aircraft's performance as far as to increase the take-off run. So it's recommended to check the take-off performance chart to determine if it is advantageous the flaps extension in the take-off.

The above indicated data are medium ones since they may be varied with relation to the aircraft's weight, balance and configuration.

- 2.12. Performance information provided in the Savannah Flight Manual for Take-off Run and Landing Distances and Landing Run is as follows:

NOTE: the maximum flaps extended airspeed is 60/96 mph/km/h.

5.2 TAKE-OFF RUN

<b>Take-off run (hard surface, flaps 20°)</b>	Maximum weight (1000/454 lbs/kg)
Sea level (MSL)	115 ft/35 m
3,000 ft/900 m pressure altitude	160 ft/50 m
6,000 ft/1,800 m press. altitude	210 ft/63 m

NOTE: if the airplane is operated from a grass runway the take-off ground roll will increase.

NOTE: to clear a 50/15 ft/m high obstacle, a practical rule suggests to double the take-off ground roll.

5.3 LANDING DISTANCES FROM 15 m AND LANDING RUN

The airplane needs 150 m for landing upon a 15 m obstacle, and a 50 m of landing run, in no wind condition at full weight, with airspeed of 60-65 km/h IAS.

2.13. Rate of Climb (*Rotax 912 UL*) information provided in the Savannah Flight Manual is as follows:

5.4 RATE OF CLIMB (Rotax 912 UL)	
Rate of climb Full power setting	Maximum weight (1000/454 lbs/kg)
Sea level (MSL)	1,100 fpm/5.5 m/s 48 mph/77 km/h
3,000 ft/900 m pressure altitude	790 fpm/4.0 m/s 45 mph/72 km/h
6,000 ft/1,800 m press. altitude	520 fpm/2.6 m/s 40 mph/64 km/h
9,000 ft/2,700 m press. altitude	300 fpm/1.5 m/s 37 mph/60 km/h

The maximum ceiling is 14,000 ft/4200 m pressure altitude at the maximum weight.

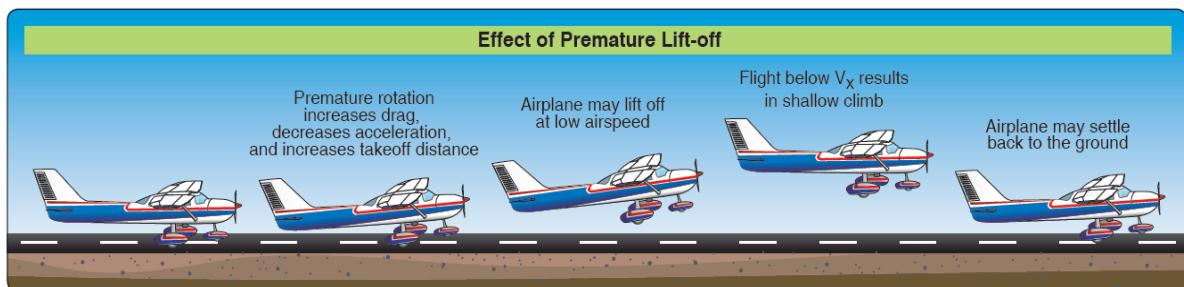
The best rate of climb speed is 48/77 mph/km/h.

The best angle of climb speed is 45/72 mph/km/h.

The best gliding angle with flaps retracted is achieved at a 60/96 mph/km/h airspeed. The Lift to Drag ratio is 12.

The fuel consumption at 75% power setting amounts to 4.9/18.5 gph/lt/h for Rotax 912 ULS and 4.3/16.2 gph/lt/h for Rotax 912 UL

2.14. The Airplane Flying Handbook states that *an attempt to pull the aircraft off the ground prematurely, or to climb too steeply, may cause the aircraft to settle back to the runway or into the obstacles. The Handbook further states that even if the aircraft remains airborne, the initial climb will remain flat and climb performance/obstacle clearance ability seriously degraded until best angle-of-climb airspeed ( $V_X$ ) is achieved.* (See Figure 3)



**Figure 3:** Effect of premature lift-off. Source: Airplane Flying Handbook, Chapter 5

### 3. FINDINGS

- 3.1. The pilot was initially issued a National Pilot Licence (NPL) on 22 July 2015 with the aircraft type endorsed on it. His last skills test was carried out on 26 March 2019 and his licence was reissued on the same day, with an expiry date of 25 March 2021. At the time of the accident, the pilot had accumulated a total of 366.9 hours of which 218.6 hours were on type.
- 3.2. The pilot was issued a Class 4 aviation medical certificate on 19 March 2019 with an expiry date of 31 March 2022, as well as a restriction to wear corrective lenses.
- 3.3. The aircraft was issued an Authority to Fly (ATF) certificate on 4 December 2018 with an expiry date of 3 December 2019.
- 3.4. The aircraft's last maintenance was carried out on 11 September 2019 at 676.0 hours and was issued with a Certificate of Release to Service (CRS) on 4 December 2018 with an expiry date of 3

December 2019 or at 691.4 hours, whichever occurs first. At the time of the accident, the aircraft had flown 6.8 hours since the last service.

- 3.5. No faults with any aircraft systems were reported during the flight and the aircraft had no previous recorded defects in the aircraft logbooks and flight folio prior to the accident flight.
- 3.6. The aircraft was structurally intact prior to impact and all damage was consistent with the accident sequence. The aircraft was destroyed during the impact sequence; the pilot and passenger sustained serious injuries.
- 3.7. The flight was conducted under visual meteorological conditions (VMC) by day with fine weather conditions prevailing at the time of the accident. The weather was not a contributory factor to the accident.
- 3.8. According to the pilot's report, the aircraft was at flap setting: 1 which is 15° flaps down, at an airspeed of 60 miles per hour (mph), however, according to the Savannah Flight Manual, the aircraft's best rate of climb speed is 48mph and the best angle of climb speed is 45mph.
- 3.9. Additionally, according to the Savannah Flight Manual, the aircraft requires 150m for landing to clear a 15m obstacle, and a 50m landing run in no wind condition at full weight, with airspeed of 37-41mph IAS. Based on this information, the aircraft was climbing too steeply during the touch-and-go exercises.
- 3.10. Graskop Airfield is an unmanned and unlicensed airfield. The aircraft came to a stop on the threshold of RWY 34. The length of the runway is approximately 850m long and 10m wide. The runway is a prepared tar surface with a positive slope of 3.1°. With the pilots directed to land in the designated touch-down box at 300m on RWY 16, the ZU-EHS pilot missed the touch-down box by approximately 450m.
- 3.11. Graskop Airfield has a hazard of pallets bricks placed on the extended centreline of RWY 16, approximately 100m from the threshold of RWY 34.
- 3.12. The investigation revealed that the aircraft's approach was high, resulting in a deep landing and touch down at approximately 750m from the threshold of RWY 16. As a result, the aircraft had less than 100m left on the runway for take-off. The pilot then rotated the aircraft prior to reaching its rotation speed and the aircraft could not climb. The aircraft, thus, impacted pallets of bricks placed on the extended centreline of the runway.

#### **4. PROBABLE CAUSE/CONTRIBUTING FACTOR**

- 4.1. The aircraft's approach was high, resulting in a deep landing and touch down at approximately 750m from the threshold of RWY 16. As a result, the aircraft had less than 100m left on the runway for take-off. The pilot then rotated the aircraft prior to reaching its rotation speed and the aircraft could not climb. The aircraft, thus, impacted pallets of bricks placed on the extended centreline of the runway.

#### **5. CONTRIBUTING FACTOR**

- 5.1. None.

#### **6. SAFETY RECOMMENDATION**

- 6.1. None.

#### **7. REFERENCES USED ON THE REPORT**

- 7.1. Savannah AFM
- 7.2. Airplane Flying Handbook, Chapter 5, Take-offs and Departure Climbs (FAA-H-8083-3B).
- 7.3. South African Weather Service Report

**This report is issued by:**

**Accident and Incident Investigations Division  
South African Civil Aviation Authority  
Republic of South Africa**