# AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | Reference: | **CA18/2/3/8789** | | |
| **Aircraft Registration** | **ZU-VDW** | **Date of Accident** | 29/05/2010 | | **Time of Accident** | 1030Z | |
| **Type of Aircraft** | Aveko S.R.O. VL3A1 Flamingo | | **Type of Operation** | | Private (Air race) | | |
| **Pilot-in-command Licence Type** | | Commercial | **Age** | 39 | **Licence Valid** | Yes | |
| **Pilot-in-command Flying Experience** | | Total Flying Hours | 1706,4 | | Hours on Type | 16,2 | |
| **Last point of departure** | FARG (Rustenburg) | | | | | | |
| **Next point of intended landing** | FARG (Rustenburg) | | | | | | |
| **Location of the accident site with reference to easily defined geographical points** (**GPS readings if possible**) | | | | | | | |
| Near Bela-Bela at GPS position S 24° 54' 27.00" & E028° 14' 54.00" at an elevation of 3674 ft / 1120 m AMSL | | | | | | | |
| **Meteorological Information** | Fine weather conditions prevailed at the time of the accident with a light south-westerly wind, mild temperature and no cloud. | | | | | | |
| **Number of people on board** | 1+1 | **No. of people injured** | 0 | **No. of people killed** | 1+1 | | |

## Synopsis

On 29 May 2010, the aircraft (ZU-VDW) took part in the President's Trophy race.

During descent the left wing failed as a result of flutter. The aircraft crashed at approximately 1030Z in clear daytime conditions near Bela-Bela (previously Warmbaths) in the Limpopo Province, destroying the aircraft and fatally injuring both occupants.

The pilot was correctly licensed and rated on the aircraft type and was the holder of a valid medical certificate as a commercial pilot.

The pilot exceeded the Vne on various occasions the day before the accident as well as on the day of the accident. The Vne (TAS) of the aircraft is 140 kts.

## Probable Cause

Wing flutter was considered to be the main cause of the wing failure.

**Contributing factor(s):**

Exceeding the design envelope of the aircraft.

Poor airmanship.

| | | | |
|---|---|---|---|
| IARC Date | | Release Date | |

# AIRCRAFT ACCIDENT REPORT

| | |
|---|---|
| **Name of Owner/Operator** | **:** Van der Walt H |
| **Manufacturer** | **:** Aveko S.R.O. |
| **Model** | **:** VL3A1 Flamingo |
| **Nationality** | **:** South African |
| **Registration Marks** | **:** ZU-VDW |
| **Place** | **:** Near Bela-Bela (Limpopo Province), GPS position S 24° 54’ 27.00” & E028° 14’ 54.00” at an elevation of 3674ft / 1120m AMSL |
| **Date** | **:** 29 May 2010 |
| **Time** | **:** 1030Z |

All times given in this report are Co-ordinated Universal Time (UTC) and will be denoted by (Z), unless indicated differently. 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 (1997) 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 establish legal liability**.*

**Disclaimer**

*This report is produced without prejudice to the rights of the CAA, which are reserved.*

## 1. FACTUAL INFORMATION

### 1.1 History of Flight

1.1.1 On 29 May 2010, the aircraft took part in the President's Trophy air race.

1.1.2 The race started at Rustenburg (FARG), then to Petrusdam (PET), Slurry (FASW), FARG, Liverpool (LIVER), Bela-Bela (FAWA) and finally back to FARG.

1.1.3 At approximately 1030Z, during the descent to FAWA (Bela-Bela), the wing failed due to flutter and the aircraft crashed.

1.1.4 Two race participants following the aircraft witnessed the aircraft break up in flight.

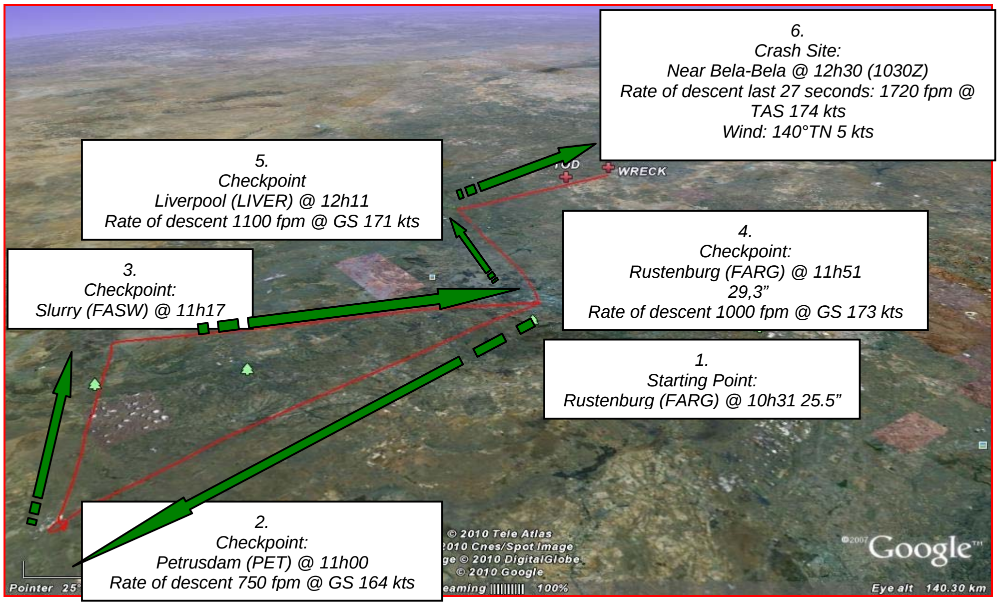



*Figure 1: Route details according to the GPS logging device on board*

## 1.2 Injuries to Persons

| Injuries | Pilot | Crew | Pass. | Other |
|---|---|---|---|---|
| Fatal | 1 | - | 1 | - |
| Serious | - | - | - | - |
| Minor | - | - | - | - |
| None | - | - | - | - |

## 1.3 Damage to Aircraft

1.3.1 The aircraft was destroyed during the accident sequence.


*Fig 2: View of the aircraft wreckage after the wings were recovered*

*Figure 3: View of the cockpit area*

## 1.4 Other damage

1.4.1 There was no damage to property or the environment.

## 1.5 Personnel information

1.5.1 Pilot-in-Command

| | | | | | |
|---|---|---|---|---|---|
| Nationality | | South African | | | |
| Licence No | ************** | Gender | Male | Age | 39 |
| Licence valid | | Yes | Type Endorsed | Yes | |
| Ratings | | Instrument (A) (Valid until 30 June 2011)<br>Instructor III (Valid until 30 November 2010)<br>Flight Test (Valid until 30 June 2011)<br>Night | | | |
| Medical Expiry Date | | 30 September 2010 | | | |
| Restrictions | | None | | | |
| Previous Accidents | | Nil | | | |

1.5.2 Pilot-in-Command Flying Experience
(Hours reflected are at the time of renewal on 12 May 2010 – Pilot Logbook not found)

| | |
|---|---|
| Total Hours | 1706,4 |
| Total Past 90 Days | Unknown |
| Total on Type Past 90 Days | Unknown |
| Total on Type | 16,2 |

## 1.6 Aircraft information

1.6.1 Airframe

| | | |
|---|---|---|
| Type | VL 3A1 Flamingo | |
| Serial no. | 30 | |
| Manufacturer | Aveko S.R.O. | |
| Date of manufacture | 8 April 2009 | |
| Total airframe hours (at time of accident) | 48,0 | |
| Last annual inspection (date & time) | 31 March 2010 | 25,0 |
| Hours since last annual inspection | 23,0 | |
| NTCA acceptance (Issue Date) | 27 November 2008 | |
| Authority to Fly (Issue Date) | 8 October 2009 | |
| C of R (Issue Date) (Present owner) | 8 April 2009 | |
| Operating Categories | Non-Type-Certified Aircraft (NTCA) | |

1.6.2 Engine

| | |
|---|---|
| Type | Rotax 912 |
| Serial No. | 565 2542 |
| Hours since new | 48,0 |
| Hours since overhaul | TBO not reached yet |

1.6.3 Propeller

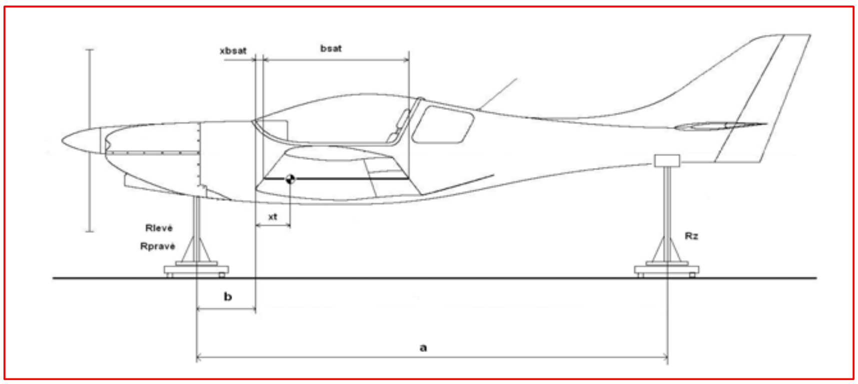
| | |
|---|---|
| Type | Woodcomp |
| Serial No. | RT 2288 |
| Hours since New | 48,0 |
| Hours since Overhaul | TBO not reached yet |


*Figure 4: The accident aircraft before the accident*

1.6.4 Aircraft load

| | |
|---|---|
| Max certified take-off mass | 560 kg<br>*(Empty mass 331 kg)* |
| Actual estimated take-off mass | 609 kg<br>*(Empty mass 331 kg + 90 kg pilot + 90 kg navigator + 98 kg fuel)* |
| Approved Limits for the C of G | 17% ± 2% Mean Aerodynamic Chord (M.A.C). |
| Actual C of G | 17% ± 2% Mean Aerodynamic Chord (MAC) |
| Note | From the above it can be seen that the maximum certified takeoff weight was exceeded by 49 kg. |

1.6.5 Aircraft Weight and Balance




1.6.6 Background information on the Vne of the aircraft

The Vne for the aircraft was originally set at 164 knots (TAS).

However, an Obligatory Bulletin (TB –VL3-006, published on 13 January 2010) limited the Vne of the aircraft to 140 knots (TAS) due to vibrations of tail surfaces reported during standard flying at high speed.

**1.7 Meteorological information**

1.7.1 According to an official weather report from the South African Weather Service, the following weather conditions prevailed at the time of the accident:

| | | | | | |
|---|---|---|---|---|---|
| Wind direction | 140° TN | Wind speed | 5 kts | Visibility | >10 km |
| Temperature | 22 °C | Cloud cover | Nil | Cloud base | N/A |
| Dew point | 5 °C | | | | |

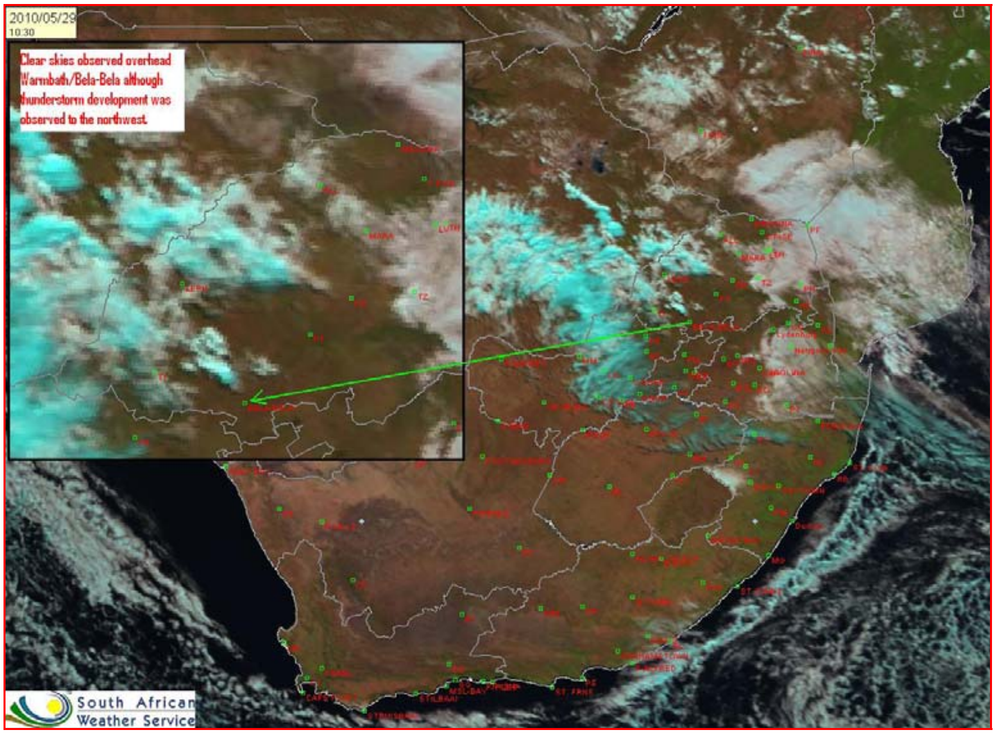


*Figure 4: Satellite image at 1200Z on 29 May 2010 showing thunderstorm development over the north-western parts of Limpopo up to the area to the immediate north-west of Bela-Bela*

## 1.8 Aids to Navigation

1.8.1 The aircraft was equipped with standard navigation equipment as per the minimum equipment list approved by the regulator for the aircraft type. No defects were reported prior to the flight.

1.8.2 The aircraft was also equipped with an MGL EFIS (Electronic Flight Instrument Systems) VOYAGER (see Fig 5). After removal this device was sent to the agents in Cape Town to be downloaded. The report-back received from the agents was that no information could be retrieved as the memory card used in this device was not present in the device. The aircraft owner advised telephonically that to the best of his knowledge no memory card had ever been installed in this device; therefore no navigational data could be extracted from the unit.

1.8.3 Background Information on the MGL EFIS VOYAGER:
Amongst many other functions this device does "black box" style logging of all flight data (primary flight, navigation, attitude, engine monitoring) on an SD card with free PC-based viewing application, including export of the flight path to Google Earth.

1.8.4 On the day prior to the air race, the accident aircraft with identification 'Race 61' was test flown by the accident pilot under the observation of a test official in order to establish a handicap speed for the air race. The test flight requires the aircraft to be flown at a constant altitude at full throttle for 4 consecutive legs of 5 minutes each with a 90 degree left turn between legs. The aircraft is effectively flown in a square. During the test flight it was noted that in straight and level flight the aircraft exceeded the maximum continuous RPM (5500 RPM) allowed by the engine manufacturer. The RPM were retarded to 5500 RPM and the RPM control lever marked so that it could not be increased in flight.

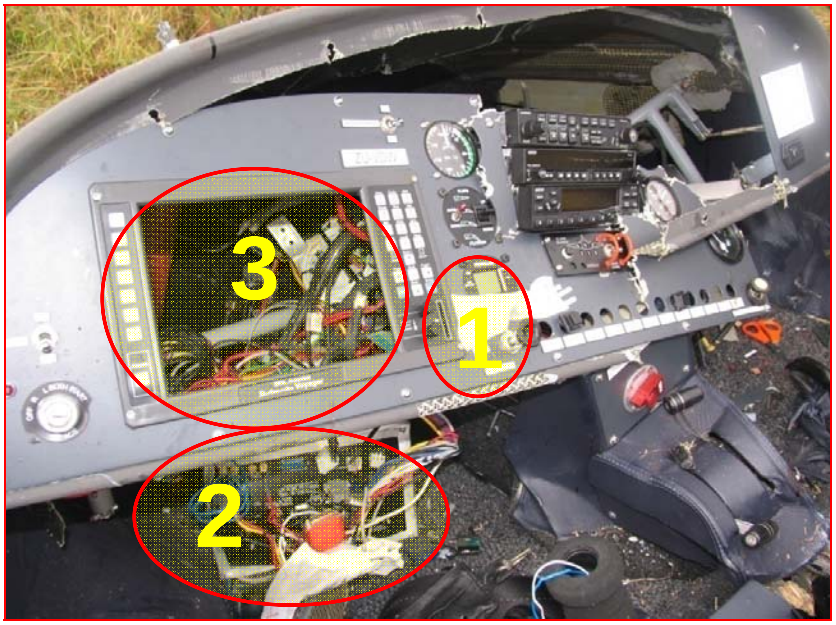



*Figure 5: Circle 1 indicates the slot for the memory card. Circle 2 indicates the position of the EFIS after the accident and circle 3 the normal position of fitment for the EFIS.*

1.8.5 The test flight was conducted with 2 crew members and full fuel tanks. The test result was that this aircraft should be capable of maintaining a maximum level indicated air speed (Vne) of 140 kts.

**1.9 Communications**

1.9.1 The aircraft was equipped with standard communication equipment as per the minimum equipment list approved by the regulator for the aircraft type. No defects were reported prior to the flight.

1.9.2 No distress calls were transmitted or recorded.

**1.10 Aerodrome Information**

1.10.1 Not applicable. The accident did not occur at an aerodrome.

**1.11 Flight recorders**

1.11.1 The aircraft was not equipped with a cockpit voice recorder (CVR) or a digital flight data recorder (DFDR) and neither was required by regulations to be fitted to this type of aircraft.

**1.12 Wreckage and Impact Information**

1.12.1 All the major components were located at positions as indicated on the diagram (see fig 7).

1.12.2 The accident took place in a flat grassland area. The aircraft hit the terrain in an easterly direction and finally stopped facing the direction 87°M. The position of the initial impact point was recorded as S24°54'27.48" & E28°14'44.75" at an elevation of 3674 ft / 1120 m AMSL (see Fig 7).

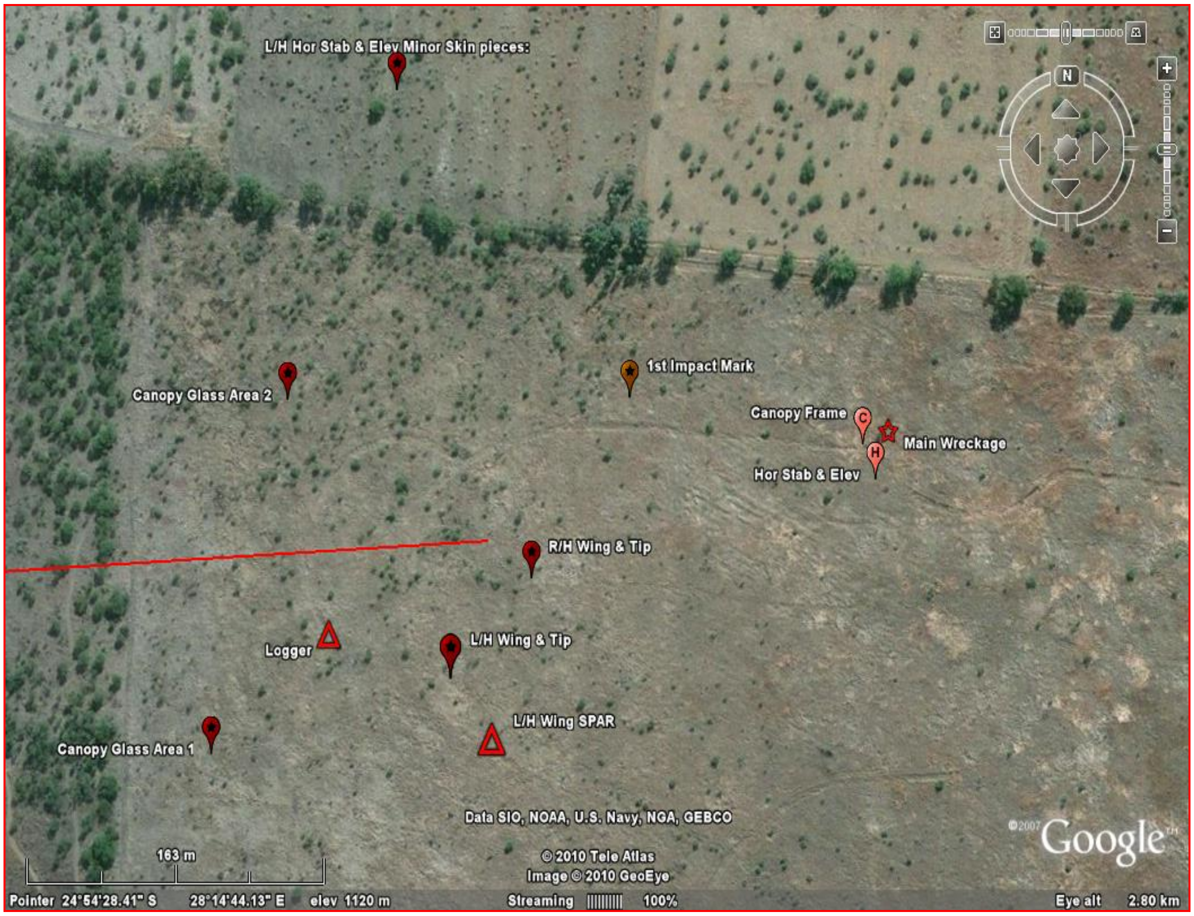



*Figure 7: Wreckage distribution on accident site*
Reference: Google Earth

1.12.3 The GPS position of the main wreckage was recorded as S24°54'27.00" & E28°14'54.00".

1.12.4 Investigation revealed that the flaps and the landing gear were retracted at the time of impact.

1.12.5 Wings (see Fig 7)

1.12.5.1 The R/H wing was located approximately 203 m SW of the main wreckage at a GPS position recorded as S24°54'30.27" & E28°14'42.84".

1.12.5.2 The L/H wing was located approximately 259 m SW of the main wreckage at a GPS position recorded as S24°54'31.83" & E28°14'41.25".

1.12.5.3 The L/H wing spar was located approximately 265 m SW of the main wreckage at a GPS position recorded as S24°54'32.78" & E28°14'42.07".

1.12.6 Canopy (see Fig 10)

1.12.6.1 The canopy frame was located at the main wreckage, but the canopy glass had disintegrated in flight and was located in two different areas as shown in fig 7.

1.12.6.2 Although witnesses stated that there were various birds in the direct vicinity of the aircraft at about the same time that the aircraft's wings separated from the airframe, no conclusive evidence of bird strike could be found.

1.12.6.3 Pieces of canopy glass, soiled with a fatty deposit, were recovered from the accident site and were submitted to the Onderstepoort Veterinary Centre / Clinic (Pathology) for investigation. The purpose was to determine whether these deposits were of an animal nature. The results proved negative.

1.12.7 Horizontal Stabiliser & Elevator (see Fig 9)

1.12.7.1 The main spar of the horizontal stabiliser was still attached to the main wreckage. However, the skin of both the L/H horizontal stabiliser and the L/H elevator were stripped partially from the spar. Pieces of the skin were located in close proximity to the main wreckage and also 318 m NW of the main wreckage at a GPS position recorded as S24°54’22.80” & E28°14’40.20”.

Note: Below are a series of photos showing the extent of the damage sustained by the aircraft during the accident sequence.


*Figure 8: Aircraft main wreckage*

*Figure 9: Aircraft empennage area*

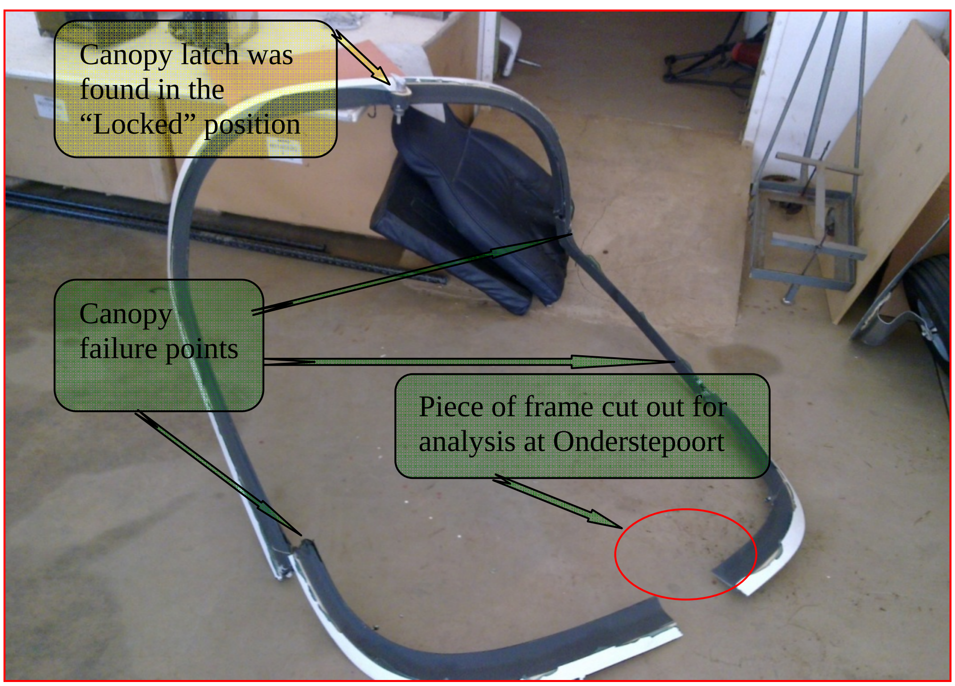



*Figure 10: Canopy frame*

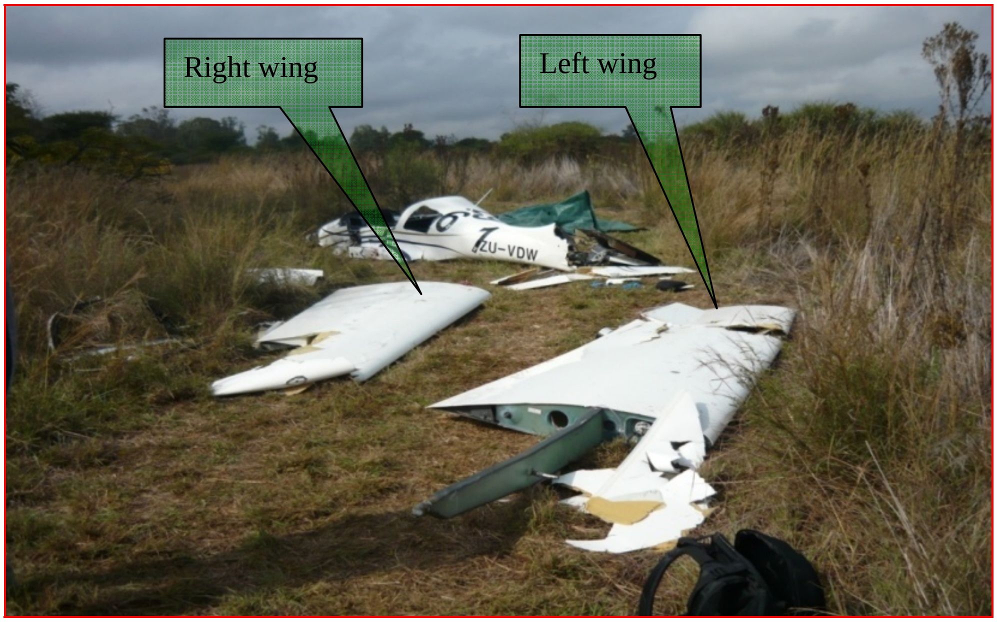



*Figure 11: LH & R/H wing after recovery*

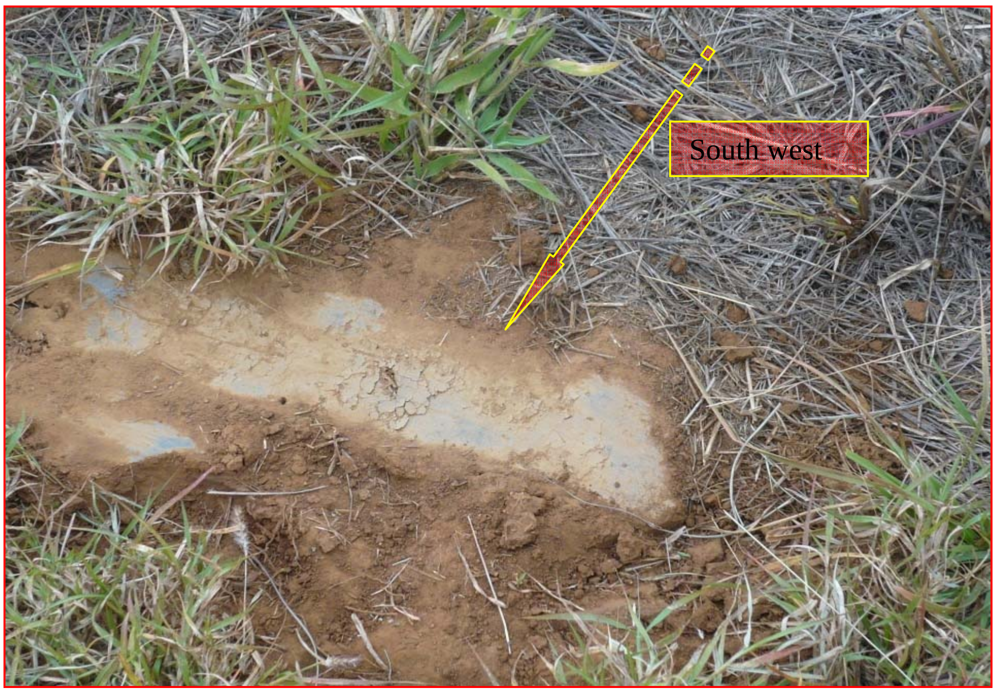



*Figure 12: Initial impact point of the fuselage with the arrow indicating the direction of movement*

## 1.13 Medical and Pathological Information

1.13.1 The results of the post mortem report and toxicology tests were not available at the time this report was compiled. Should any of the results, once received, indicate that medical aspects may have affected the performance of the flight crew members, this will be considered as new evidence and the investigation re-opened.

## 1.14 Fire

1.14.1 There was no evidence of pre- or post-impact fire.

## 1.15 Survival Aspects

1.15.1 The pilot-in-command was seated in the left-hand seat and the passenger (navigator) was seated in the right-hand seat at the time of the accident.

1.15.2 Both occupants sustained serious leg, chest and facial injuries.

1.15.3 Neither of the occupants made use of the shoulder harnesses, as these were still tied up with cable wraps at the time of the accident.

*Figure 13: Both shoulder harnesses were tied up with cable ties, i.e. not worn*

1.15.4 Due to the high vertical impact forces exerted on the aircraft during the accident sequence, this accident was not considered survivable.

## 1.16 Tests and research

1.16.1 GPS data logging device (logger):

Every aircraft in the President's Trophy air race was equipped / issued with a GPS data logging device (logger).

1.16.1.1 *BACKGROUND*
The device is manufactured in South Africa by Tilt-Tech cc and is designed to store its GPS position at pre-set intervals. The recording is tamper proof and has a built-in internal GPS receiver.

1.16.1.2 The logger issued to ZU-VDW was a micrologger powered by a 9V battery and was set to log its position every 1 second.

This data was downloaded by software specially designed for this purpose called Air-Observer.

With the logger set as it was prior to the race, the unit recorded the following information every second:

- Time to within 1 second
- GPS co-ordinates to within 1 m (excluding GPS error)

- Altitude to within 1 ft
- Ground speed to within 1 kt

1.16.2 Factual Information obtained from the logger following the accident revealed that the logger stopped functioning at the following instant:

| | | |
|---|---|---|
| Time | - | 12h29:07B |
| Position | - | S24 54.495 E28 14.700 |
| Altitude | - | 4926 ft |
| Speed | - | 184 kts (TAS) |

1.16.3 Before the logger stopped functioning, the following points were noted:

| | Top of descent (TOD) | 1 minute after TOD | 2 minutes after TOD |
|---|---|---|---|
| Time (B) | 12:26:40 | 12:27:40 | 12:28:40 |
| Altitude | 7505 ft | 7060 ft | 5700 ft |
| Speed (TAS) | 146 kts | 166 kts | 184 kts |

1.16.4 At the instant the logger of ZU-VDW ceased functioning, two race participants following the aircraft witnessed the aircraft break up in flight.

One witness was 1525 metres behind the accident aircraft at an altitude of 4001 ft and a second witness was 3001 metres behind the accident aircraft at an altitude of 3959 ft.

*One of these witnesses made the following statement on "Avcom.com."*

*Both wings of the Flamingo two-seater plane "fluttered like feathers" while the fuselage fell straight to the ground, said the witness who flew right behind the Flamingo in his own plane.*

*They were flying straight towards the turning point at Bela Bela when he saw the white of the plane's wings "unfold".*

*"It looked like feathers floating around and afterwards some of the stuff that the plane was made of blew through the air like confetti.*

*"I said to my co-pilot: 'Look, that plane is breaking up.' But it was so unreal that I wondered if it hadn't perhaps been a whirlwind."*

Unfortunately neither of these participants submitted any statements to the IIC, even after several requests to do so.

**1.16.5 The day of the accident**

1.16.5.1 The logger was switched on at 09h19:37B.

1.16.5.2 The aircraft commenced taxiing to the holding point at 10h26:23B.

1.16.5.3 The aircraft commenced takeoff roll at 10h30:46B.

1.16.5.4 The aircraft flew from Rustenburg to Petrusdam to Slurry to Rustenburg to Liverpool and was en route to Bela-Bela when the accident occurred.

1.16.6 The race required the aircraft to overfly each checkpoint at between 200 and 500 feet above ground level (AGL).

1.16.7 For a period of 5 minutes prior to TOD the aircraft was flying at a constant altitude of 7650 ft (+/- 50 ft) at a constant ground speed of 152 kts (+/- 1kt).

1.16.8 The aircraft track prior to the accident was at approximately 090°T.

1.16.9 It was reported that the winds at the time of the accident were estimated to be:

260/13 kts at 7400 ft
280/12 kts at 6800 ft
290/10 kts at 6200 ft
300/09 kts at 5600 ft

Analysis:

The aircraft was tested at 142 kts (TAS) maximum speed and was logged doing a straight and level ground speed of 152 kts. By this calculation one can deduce that there was a 10 kt tailwind, and this concurs with the winds estimated by the weather office.

At TOD the aircraft was 10,46 nm west of the Bela-Bela turning point at 7505 ft AMSL (3845 ft AGL). Assuming the pilot intended flying over the turning point at 200 ft AGL, he was 3645 feet above his target altitude. Further assuming a ground speed of 152 kts, he would have had to descend at 860 feet per minute to reach his target altitude.

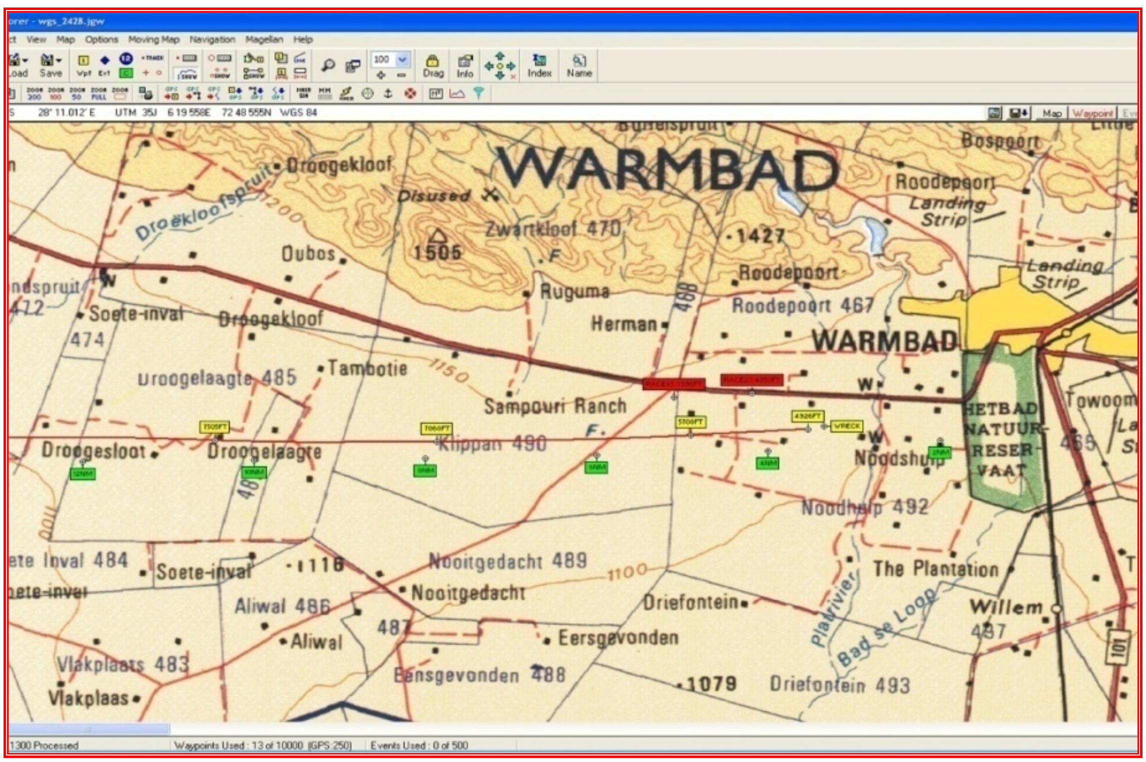



*Figure 14: Map of the Warmbaths (Bela-Bela) area*

From the logger it was determined that he descended at 445 ft / min during the 1st minute after commencing the descent. During the 2nd minute after commencing the descent he descended at 1360 ft / min and at 774 ft / min during the last 27 seconds recorded.


*Figure 15: Last 3 minutes of the logger recording*

1.16.10 There was no indication on the logged flight path of any abrupt change in pitch or direction.

1.16.11 The canopy glass disintegrated in flight. The logger was placed on the glare shield and it is assumed that when the canopy glass disintegrated, it hit the logger, causing the battery to disconnect and the logger to stop recording.

1.16.12 The diagram (Figure 15) showed that during the accident flight the aircraft was logged doing a straight and level ground speed of 152 kts. Bearing in mind that the aircraft was tested at 142 kts (TAS) maximum speed, it can be deduced that there was a 10 kt tailwind.

1.16.13 ADDITIONAL INFORMATION:

1.16.13.1 On the descent to Petrusdam, the aircraft was in a 750 fpm descent with a recorded ground speed of 164 kts.

1.16.13.2 On the descent to Rustenburg from 8500 ft AMSL the aircraft was in a 1000 fpm descent with a recorded ground speed of 173 kts.

1.16.13.3 On the descent to Liverpool from 8500 ft AMSL the aircraft was in a 1100 fpm descent with a recorded ground speed of 171 kts.

1.16.14 During the previous day's race, the aircraft descended to Bela-Bela at 1100 ft / min with a recorded ground speed of 194 kts (estimated true airspeed 172 kts) and to the finish at 1000 ft / min with a recorded ground speed of 185 kts (estimated true airspeed 176 kts).

## 1.17 Organisational and management information

1.17.1 The race organisers required the aircraft to overfly each checkpoint at between 200 and 500 feet above ground level (AGL) to enable them to see the race number of the aircraft.

## 1.18 Additional information

1.18.1 Flutter

1.18.1.1 Flutter is defined as the coupling of different oscillation modes on a system.

1.18.1.2 In flight, due to its flexibility, the wing of an aircraft can oscillate in torsion and in flexion. The frequencies of these two motions depend on speed. If, in some conditions, they are identical or very close each other, "auto-excitation" can take place. This means that the oscillation on one axis can amplify the other oscillation and vice versa, therefore increasing the energy. If the amplitude becomes too great, a rupture may occur very quickly.

1.18.1.3 This phenomenon is similar to what happens when a child is on a swing. Moving the legs at the right frequency amplifies the motion of the swing and increases the global energy. Flutter can also occur on structures other than aircraft. The rupture of the Tacoma suspension bridge in the USA, about 60 years ago, showed how a very strong wind amplified several oscillation modes until the bridge broke up. Now all suspension bridges must be sized to resist the strongest winds.

1.18.2 Flutter characteristics (Reference: Airbus Safety Magazine; August 2010 Edition):

1.18.2.1 On an airplane, flutter is characterized by oscillations diverging very quickly. Therefore, the risk of flutter within the flight envelope, and even well outside the borders to have a safety margin, is not acceptable.

1.18.2.2 The flutter limit of an aircraft is established by Vne. This speed should be observed as a TAS and not an IAS, since flutter is independent of air density.

1.18.3 Event description

1.18.3.1 At top of descent (TOD) the aircraft was 10,46 nm west of the Bela-Bela turning point at 7505 ft above mean sea level (AMSL) / 3845 ft above the target ground altitude. Assuming that the pilot intended flying over the turning point at 200 ft AGL, he was 3645 feet above his target altitude. At a ground speed of 152 kts, he would have had to descend at 860 feet per minute to reach his target altitude.

He commenced descent and descended 445 feet in 1 minute. After one minute he needed to descend at 1000 feet per minute. He continued his descent and descended 1360 feet in another 1 minute. He then descended 774 feet in the final 27 seconds (1720 feet per minute).

1.18.4 There is no indication on the logged flight path of any abrupt change in pitch or direction.

1.18.5 The logger stopped functioning at 12h29:07B, at a GPS position of S24° 54,495" & E028° 14,700", an altitude of 4926 ft AMSL and at a GS (ground speed) of 184 kts. It can be concluded from this information that this was the point where the canopy glass disintegrated and where the wings failed and departed from the aircraft.

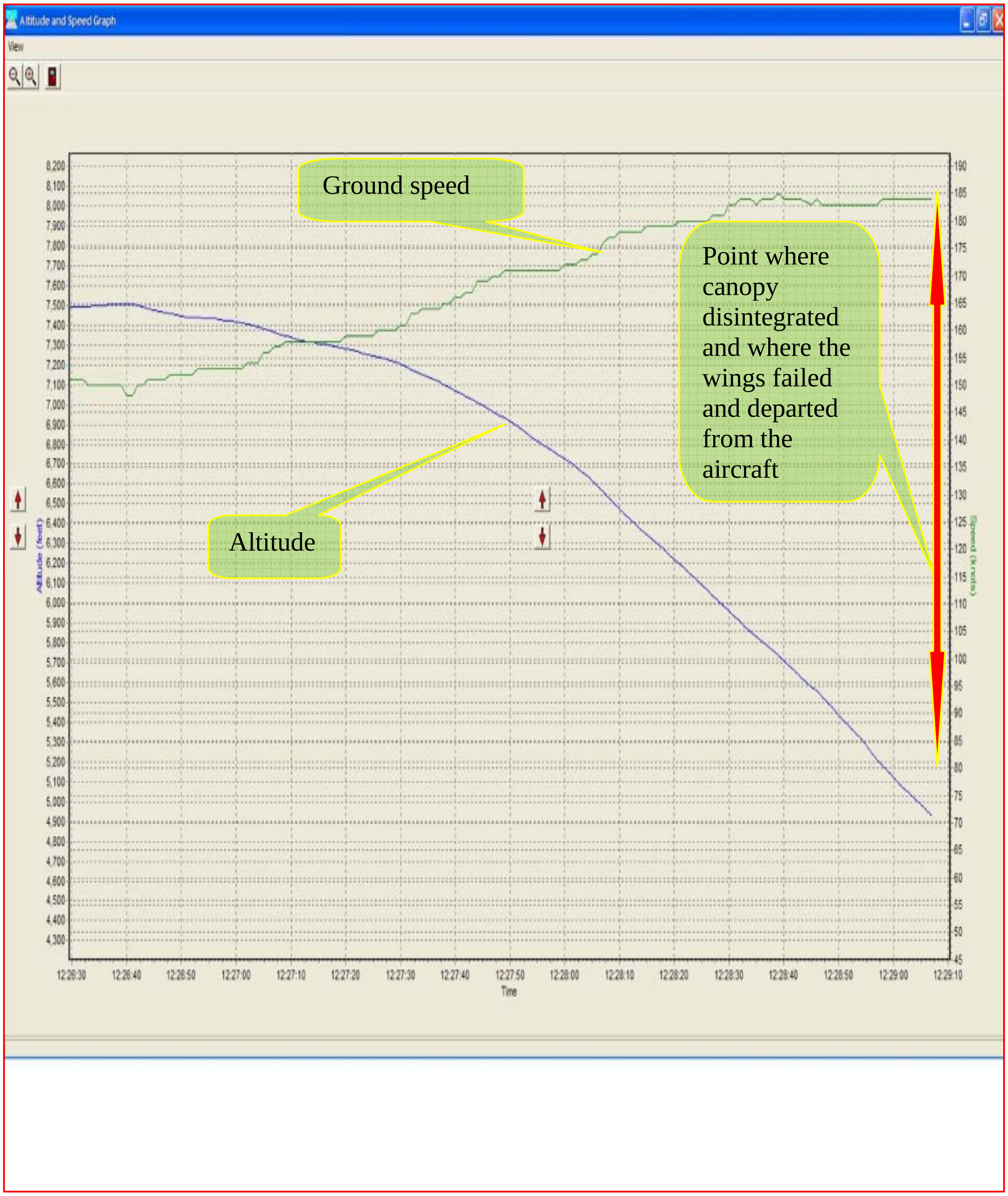



*Figure 16: Logger details of the last 3 minutes of recording*

1.18.6 Additional Information:

1.18.6.1 During the previous day's race, the aircraft descended to Warmbaths at 1100 fpm at a recorded ground speed of 194 kts (estimated true airspeed 172 kts). Also during the previous day's race, the aircraft descended to the finish (FARG) at 1000 fpm with a recorded ground speed of 185 kts (estimated true airspeed 176 kts).

1.18.6.2 It is important to note that in all recorded descents, a 1000 fpm descent produced an increase in GS (ground speed) of between 21 and 30 kts.

1.18.6.3 The pilot commenced his descent at 23,47158 km from where the wreckage was located.

1.18.6.4 The manufacturer advised that some modifications have been made to the aircraft since this accident. These modifications are intended to reduce the vibrations reported and include covering the gap between the elevator and the horizontal stabilizer with Teflon tape. In addition some reinforcements have been added to the mounting bracket for the elevator control arms.

1.18.6.5 At present the manufacturer is running a trial test of the effectiveness of these modifications. If they prove to be successful, the Vne will be increased to 164 knots.

**1.19 Useful or effective investigation techniques**

1.19.1 None.

## 2. ANALYSIS

2.1 On 29 May 2010, the aircraft (ZU-VDW) took part in the President's Trophy race. The race took place over a 2 day period. The race route was from Rustenburg (FARG) to Petrusdam (PET) to Slurry (FASW) to FARG to Liverpool (LIVER) to Bela-Bela (FAWA) and back to FARG.

2.2 The aircraft crashed on the second day of the race at approximately 1030Z in clear daytime conditions near Bela-Bela (previously Warmbaths) in the Limpopo province, destroying the aircraft and fatally injuring both the pilot and navigator.

2.3 The pilot was correctly licensed and rated on the aircraft type and was the holder of a valid medical certificate as a commercial pilot.

2.4 According to available information the aircraft was maintained as required by the regulations.

2.5 The weather did not play a role in this accident.

2.6 During the final 27 seconds of recording by the logger, while descending to Warmbaths (Bela-Bela), it was recorded that the aircraft was descending at 1720 ft/min at an estimated TAS of 174 kts. During the previous day's race, the aircraft descended to Warmbaths at 1100 fpm with a recorded ground speed of 194 kts (estimated true airspeed 172 kts). Also during the previous day's race, the aircraft descended to the finish (FARG) at 1000 fpm with a recorded ground speed of 185 kts (estimated true airspeed 176 kts). On ALL recorded descents, a 1000 fpm descent produced an increase in GS of between 21 and 30 kts. Evidence suggests that the aircraft was operated outside of the design envelope on various occasions prior to the accident.

2.7 Of all the possible causes of wing failure considered, the most likely cause was flutter.

2.8 Neither of the occupants was wearing their shoulder harnesses, as these were still tied up with cable wraps.

## 3. CONCLUSIONS

### 3.1 Findings

3.1.1 On 29 May 2010, the aircraft (ZU-VDW) took part in the President's Trophy race.

3.1.2 During descent the wings failed as a result of flutter. The aircraft crashed at approximately 1030Z in clear daytime conditions near Bela-Bela (previously Warmbaths) in the Limpopo province, destroying the aircraft and fatally injuring both occupants.

3.1.3 The pilot was correctly licensed and rated on the aircraft type and was the holder of a valid medical certificate as a commercial pilot.

3.1.4 According to available information the aircraft was maintained as required by the regulations.

3.1.5 The weather did not play a role in this accident.

3.1.6 The pilot exceeded the Vne at various occasions the day before the accident as well as on the day of the accident.

### 3.2 Probable Cause(s)

3.2.1 Wing flutter was considered to be the main cause of the wing failure.

### 3.3 Contributing factor(s):

3.3.1 Exceeding the design envelope of the aircraft.

3.3.2 Poor airmanship.

## 4. SAFETY RECOMMENDATIONS

4.1 The logger showed that during the previous day as well as on the day of the accident, the pilot exceeded the aircraft's design limitations (Vne) on various occasions.

It is therefore recommended that during air races, such as the President's Trophy, the organisers ensure that the logger devices are downloaded at the end of each race day and that pilots who exceeded the flight envelope of the aircraft in any respect should be disqualified from the race with immediate effect and reported to the authorities (SACAA) for further possible action.

## 5. APPENDICES

5.1 None.

Report reviewed and amended by the Advisory Safety Panel 8 February 2011.

-END-