

AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference:	CA18/2/3/8822	
Aircraft Registration	ZU-ETC	Date of Accident	21 August 2010		Time of Accident	0516Z
Type of Aircraft	Cheetah XLS		Type of Operation	Private		
Pilot-in-command Licence Type		Private	Age	65	Licence Valid	Yes
Pilot-in-command Flying Experience		Total Flying Hours	638.25		Hours on Type	17.5
Last point of departure		Springs Aerodrome (FASI), Gauteng Province				
Next point of intended landing		Springs Aerodrome (FASI), Gauteng Province				
Location of the accident site with reference to easily defined geographical points (GPS readings if possible)						
In open field approximately 48 m from Runway 03 at FASI (S26° 15.020 E028° 23.536 at 1647m elevation)						
Meteorological Information		Temperature: 08 °C; Dew point: 06 °C; Wind: 340 °/04 knots; Cloud cover: Low; Visibility: Poor				
Number of people on board	1+1	No. of people injured	0	No. of people killed	2	
Synopsis						
<p>On 21 August 2010 the pilot, accompanied by a passenger who also was a pilot, took off on a private flight from Runway 03 at Springs Aerodrome with the intention of landing back at Springs Aerodrome. They flew a left-hand circuit and performed two unsuccessful landing attempts. After the second go-around the pilot lost control of the aircraft and collided with the ground in a nose-down attitude.</p> <p>The occupants sustained fatal injuries. The aircraft was destroyed in the accident.</p> <p>Witnesses of the accident flight observed that there was low lying fog and poor visibility at the time.</p>						
Probable Cause						
<p>The aircraft crashed after the second go-around.</p> <p><u>Contributory factor/s</u></p> <ol style="list-style-type: none"> 1. Poor visibility due to low lying fog. 2. Two unstable approaches and unsuccessful landing attempts due to the wind. 						
IARC Date				Release Date		



AIRCRAFT ACCIDENT REPORT

Name of Owner/Operator : DM Mackeown
Manufacturer : Rainbow Aircraft (PTY) LTD
Model : Cheetah XLS
Nationality : South African
Registration Marks : ZU-ETC
Place : Springs, Gauteng
Date : 21 August 2010
Time : 0516Z

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 (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 given without prejudice to the rights of the CAA, which are reserved.

1. FACTUAL INFORMATION

1.1 History of Flight

- 1.1.1 On 21 August 2010 the pilot and passenger, who also was a pilot, taxied from the northern hangars at Springs Aerodrome (FASI) to Runway 03. Two witnesses, also pilots, stated that they thought that the pilot was positioning the aircraft to the taxiway at the southern hangar, as FASI had hosted a breakfast fly-in that was scheduled for 0600Z. They stated that it was not a suitable time for flying due to the weather conditions. The windsock was indicating that the wind speed was more than 10 knots. Also, low lying fog restricted visibility.
- 1.1.2 The pilot and passenger then took off from Runway 03 and the witness stated that he saw the aircraft climbing and disappearing through the fog. The witness then went to get his handheld radio to advise the pilot of the accident aircraft that instrument metrological conditions (IMC) were prevailing and these conditions were not suitable for flying. The witness broadcasted to the aircraft on VHF frequency 122.4 MHz but did not receive a response from the pilot of the accident aircraft. However, a pilot who was at a different hangar at FASI responded to his radio transmission call on the same VHF 122.4 MHz frequency.
- 1.1.3 According to witnesses and also information obtained from the onboard GPS, the aircraft flew a left-hand circuit around the aerodrome after takeoff. During the downwind leg of the circuit the distance of the aircraft was approximately 300 m from Runway 03 centre line and approximately 50 to 60 m above ground level (AGL). The pilot turned right onto base leg when the aircraft was opposite the

threshold of Runway 03. During the turn the aircraft overshot the runway centre line. A slight S-turn was initiated to line up with the runway centre line.

- 1.1.4 At this point the aircraft was a few metres to the left of the tarmac edge and approximately 14 m above the threshold of Runway 03. The GPS showed that the aircraft gradually moved right towards the centre line and seemed to touch down approximately 200 m after the threshold. The aircraft veered off to the left by 10 degrees. The witness reported that the aircraft appeared to be unstable during the approach due to the wind.
- 1.1.5 The pilot initiated a go-around and the aircraft then climbed away in a left-hand orbit to about 25 m AGL. On the latter part of the orbit and during the turning approach, the aircraft again overshot the centre line of Runway 03, to the right-hand side by about 30 m. The second approach was also unstable and the witness stated that it was apparent that the pilot was battling with the wind and struggling to put the aircraft down.
- 1.1.6 The aircraft did not touch down, and began a second left-hand orbit, crossing runway 03 from the right at a heading of 347 degrees at approximately 6 m AGL. The highest point of the final turn was approximately 12 m AGL and the ground speed about 7 km/h slower than the first orbit. During the last 10 seconds, the aircraft descended to about 7 m AGL and the speed increased by 10 km/h to 99 km/h at impact. The position of impact is shown as S26° 15.020 E028° 23.536 at an elevation of 1647 m and it occurred at 0516:05Z.
- 1.1.7 One of the first responders at the accident scene, a paramedic, attempted to attend to the occupants. The occupants had suffered fatal injuries during the accident sequence.

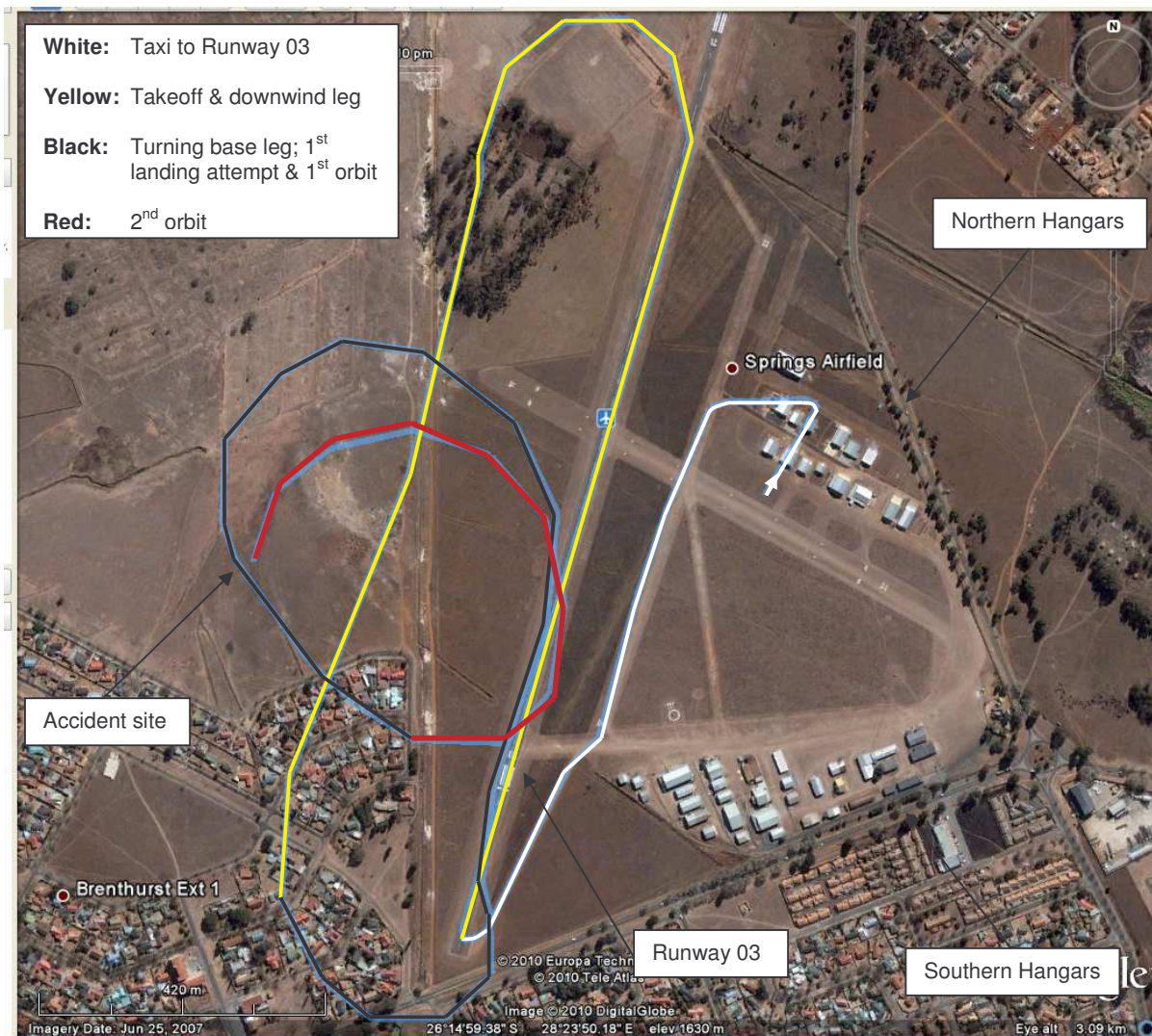


Figure 1, Shows the track of the left-hand circuit flown on the day.

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 in the accident.



Photo 2: A view of the aircraft wreckage.

1.4 Other Damage

1.4.1 No other damage was sustained.

1.5 Personnel Information

Nationality	South African	Gender	Male	Age	65
Licence Number	0270276520	Licence Type	Private Pilot		
Licence valid	Yes	Type Endorsed	Yes		
Ratings	Instrument Rating; Night Rating				
Medical Expiry Date	30 November 2010				
Restrictions	Corrective lenses				
Previous Accidents	Nil				

Flying Experience:

Total Hours	638.25
Total Past 90 Days	1.8
Total on Type Past 90 Days	0
Total on Type	17.5

1.6 Aircraft Information

1.6.1 General Description:

The Cheetah XLS aircraft is a high wing, two-seater, single-engine airplane equipped with a fixed tricycle landing gear. With its fully enclosed cabin it has a bolted aluminium frame throughout, covered with Dacron cloth. The powerplant fitted is a 65hp Rotax 582 engine with a composite three-bladed Aerolux ground adjustable propeller. This accident aircraft, ZU-ETC, was manufactured in 2007 at the manufacturer's facility in South Africa. The aircraft is classified as a Non-Type Certified Aircraft (NTCA).



Photo 3: A view of a Cheetah XLS

Airframe :

Type	Cheetah XLS	
Serial Number	CH092	
Manufacturer	Rainbow Aircraft (PTY) LTD	
Date of Manufacture	2007	
Total Airframe Hours (At time of Accident)	172.2	
Last MPI (Date & Hours)	151.1	20 February 2010
Hours since Last MPI	21.1	
Authority to Fly (Issue Date)	23 February 2010	
C of R (Issue Date) (Present owner)	06 March 2009	
Operating Categories	Private Use	

Engine :

Type	Rotax 582
Serial Number	6504812
Hours since New	172.2
Hours since Overhaul	54.4

Propeller :

Type	Aeroprop
Serial Number	2287-238-2286
Hours since New	172.2
Hours since Overhaul	Not Reached

- 1.6.2 According to the logbook, the engine was overhauled on 06 July 2009. During the overhaul, new rings and new plugs were fitted, the engine was de-coked, gearbox oil was replaced and the air cleaners cleaned. The aircraft flew a further 54.4 hours (approximately) until the day of the accident.
- 1.6.3 During the investigation, a remaining fuel quantity of approximately 50 litres was found in the fuel tanks. The fuel was sufficient for the flight.
- 1.6.4 Weight and Balance:
With the two occupants onboard, fuel and baggage, the total mass of the aircraft was calculated to be approximately 509 kg. The weight of the aircraft was within limits for the flight and calculated at 51 kg below the maximum takeoff weight of 560 kg.
- 1.6.5 Propeller evidence at the wreckage site was consistent with the engine producing power at impact.

1.7 Meteorological Information

- 1.7.1 An official weather report was obtained from the South African Weather Services:

i. SURFACE ANALYSIS (0600Z 21 AUGUST 2010):

A surface high pressure system situated east of the country extends a ridge over the north-eastern parts, causing an onshore flow of maritime air into the Limpopo Valley down to the eastern parts the North-West, Gauteng, and up to the central parts of Mpumalanga. This high pressure system also provides stable atmospheric conditions; as a result the affected moisture will give rise to stratus and/or stratocumulus clouds.

ii. SATELLITE IMAGE (0500Z 21 AUGUST 2010):

Low clouds (stratus clouds) occur over the northern parts of Limpopo Province, extending to the west and south-west, up to the southern parts of Gauteng and central Mpumalanga. Broken to overcast stratus clouds are observed over the southern parts of Gauteng in the vicinity of the aircraft incident.

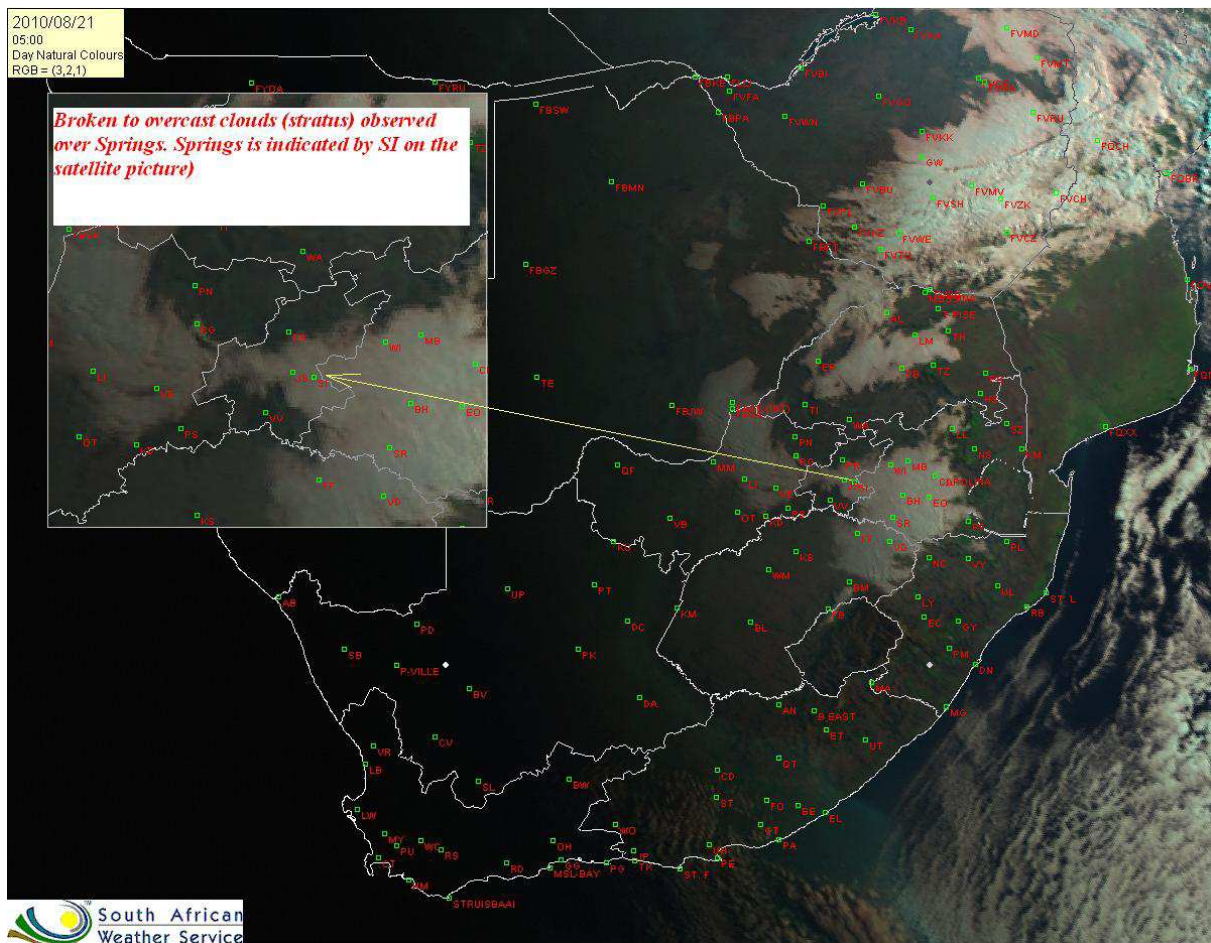


Photo 3. Satellite image, indicating partly cloudy conditions at the location of the accident.

iii. Weather conditions in the vicinity of the accident:

No official observations were available at the time and place of the accident. The most likely surface conditions at Springs at about the time of the accident were similar to those given below:

Time: 0500Z

Temperature: 08 °C

Dew Point: 06 °C

Surface Wind: 340 °TN 04 knots

Cloud cover: Not reported at Springs, but satellite imagery shows low clouds with the likelihood of mist and/or fog patches in the vicinity. The OR Tambo International Airport is located at approximately 25 km to the northwest of Springs and reported low cloud with mist on this morning.

Weather: Possibility of mist or fog patches as inferred from the satellite image in comparison with the report from the neighbouring manned weather station. The dew-point

depression (temperature and dew-point difference) of 2 °C also indicates the presence of moisture near the surface.

Visibility: Not reported, but most likely to be poor in mist or fog patches.

- 1.7.2 Witnesses who were at Springs Aerodrome during the accident flight reported poor visibility due to low-lying fog; Wind speeds that exceeded 10 knots were also indicated by the windsock at the airfield.



Photo 4. The weather conditions approximately 20 minutes after the accident had occurred.

1.8 Aids to Navigation

- 1.8.1 The aircraft was fitted with the standard navigational aids fitted to this type of aircraft which include an Air Speed Indicator, Altimeter, Compass and Ball type Turn & Bank Indicator. No anomalies regarding the navigational aids were recorded or reported prior to the accident.
- 1.8.2 The aircraft had a GPS, Garmin GPS map 196, serial number 65509063 on board, which was successfully downloaded on 31 August, 2010.

1.9 Communications

- 1.9.1 The aircraft was fitted with an ICOM A210 panel mounted radio. There was no report of failures on the communications system prior to the accident.
- 1.9.2 The pilot had operated the aircraft from an unmanned aerodrome, FASI. The allocated VHF frequency for FASI is 122.4 MHz. During the takeoff sequence of ZU-ETC, the witness attempted to communicate with the pilot of ZU-ETC from his handheld radio on the 122.4 MHz VHF frequency. No response was received from ZU-ETC, however another pilot at a hangar at the airfield responded to his call on the 122.4 MHz VHF frequency.
- 1.9.3 As the radio was destroyed during the impact sequence, it could not be determined whether it was functioning or tuned to the correct channel during the flight. The pilot's notes in the cockpit, however, revealed the frequency for FASI written as 124.4 MHz instead of 122.4 MHz. It was thus believed that the radio of ZU-ETC was tuned to 124.4 MHz, hence the lack of response.

1.10 Aerodrome Information

- 1.10.1 The accident occurred in an open field outside the boundaries of the aerodrome approximately 48 metres from the threshold of Runway 03 at FASI.

1.11 Flight Recorders

- 1.11.1 The aircraft was not fitted with a Cockpit Voice Recorder (CVR) or a Flight Data Recorder (FDR) nor was this required by regulations.

1.12 Wreckage and Impact Information

- 1.12.1 The pilot and passenger took off from Runway 03 and the aircraft made a left-hand turn whilst climbing after takeoff. The aircraft continued on the downwind leg, then turned base leg for landing. The pilot initiated a go-around and climbed away in a left-hand orbit for the second landing attempt. The second landing attempt was unsuccessful and was aborted. A second orbit to the left was initiated, during which the pilot lost control of the aircraft. The aircraft collided with the ground in a nose-down attitude.
- 1.12.2 The aircraft sustained damage to the fuselage airframe structure and fabric, wing structure and fabric, undercarriage, engine and propeller during the impact sequence.

1.13 Medical and Pathological Information

- 1.13.1 A post-mortem examination was performed on the pilot as well as the passenger. The post-mortem report of both occupants determined the cause of death to be multiple blunt force injuries.
- 1.13.2 The results of the toxicology tests were not available at the time when the report was compiled. Should any of the results indicate that medical aspects may have

affected the performance of the pilot, this will be considered as new evidence and the investigation reopened.

1.14 Fire

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

1.15 Survival Aspects

1.15.1 Although the occupants were secured with safety harnesses, the accident was not considered survivable due to the magnitude of the deceleration forces.

1.16 Tests and Research

1.16.1 The aircraft had a GPS on board, Garmin GPS map 196, serial number 65509063, which was successfully downloaded on 31 August, 2010. The unit was in good condition with no visible sign of damage.

The following is an extraction from the report of the downloaded GPS:

- *The aircraft taxied from the northern hangars, south along Runway 22 onto the extreme southern end of runway 03. The GPS indicates an altitude of 1644 m at this point.*
- *After takeoff, the aircraft made a climbing turn to the left, at 1711 m ie 67 m AGL, at the northern end of runway 03.*
- *The aircraft kept within 300 m of runway 03 centre line on the downwind leg at about 50 to 60 m AGL.*
- *A descending right-hand turning base leg was initiated when opposite runway 03 threshold. The final part of the turn overshot the centre line and an S-turn had to be performed. At the threshold markings, the aircraft was now parallel to the centre line, but a few metres to the left of the tarmac edge, but at 1658 m, ie 14 m above the runway.*
- *The aircraft gradually moved to the right towards the centre line and touched down about 200 m after the threshold, but in doing so, seemed to veer off to the left by 10 degrees, probably still on the ground. At a point 20 m to the left of the tarmac edge, it turned a further 30 degrees to the left and climbed away in a left-hand orbit, but never higher than 1669 m, ie 25 m AGL.*
- *On the latter part of the second orbit, during the turning approach, it again overshot the centre line of runway 03, to the right-hand side by about 30 m.*
- *The aircraft did not touch down, and began a second left-hand orbit, crossing the runway 03 from the right at a heading 347 degrees true at 1650 m, ie 6 m agl. The highest point of this final turn was 1656 m, ie 12 m agl and the ground speed was now about 7 km/h slower than in the first orbit. During the last 10 seconds, the aircraft descended to about 7 m AGL and the speed increased by 10 km/h to 99 km/h at impact.*
- *The impact altitude is shown as 1647 m, ie 3 m above takeoff point. The position of impact is shown as S26 15.020 E028 23.536 and it occurred at 07:16:05. Google Earth images indicate that there may have been rising ground just on the outside of the final part of the turn.*

1.16.2 Stalls

Reference: Airplane Flying Handbook, FAA-H-8083-3A, dated 2004

A stall occurs when the smooth airflow over the airplane's wing is disrupted, and the lift degenerates rapidly. This is caused when the wing exceeds its critical angle of attack. This can occur at any airspeed, in any attitude, with any power setting.

A number of factors may be induced as the result of other factors. For example, when the airplane is in a nose-high turning attitude, the angle of bank has a tendency to increase. This occurs because with the airspeed decreasing, the airplane begins flying in a smaller and smaller arc. Since the outer wing is moving in a larger radius and traveling faster than the inner wing, it has more lift and causes an overbanking tendency. At the same time, because of the decreasing airspeed and lift on both wings, the pitch attitude tends to lower.

Stall accidents usually result from an inadvertent stall at a low altitude in which a recovery was not accomplished prior to contact with the surface.

1.17 Organisational and Management Information

1.17.1 The aircraft was classified as a Non-type Certificated Aircraft (NTCA). The aircraft was registered as an Amateur-built Fixed Wing and operated in the recreation sector. The pilot flew the aircraft on a private flight which was in accordance with the requirements of CAR, Part 94.

1.17.2 The aircraft was maintained by an Approved Person authorised by the Aero Club of South Africa (AeCSA). The Approved Person had appropriate ratings to perform maintenance on the aircraft.

1.18 Additional Information

1.18.1 None

1.19 Useful or Effective Investigation Techniques

1.19.1 None considered necessary.

2. ANALYSIS

2.1 On the morning of 21 August 2010 the pilot, accompanied by a passenger, taxied from the northern hangars at Springs Aerodrome to Runway 03. Witnesses thought the pilot was positioning the aircraft to the taxiway at the southern hangar, as Springs Aerodrome was hosting a breakfast fly-in that was scheduled for 0600Z. The weather conditions were not considered suitable for flying, as low lying fog restricted visibility and the windsock indicated wind speeds of more than 10 knots.

2.2 The aircraft then took off from Runway 03 at Springs Aerodrome and was seen

before it disappeared in the fog at approximately 60 m AGL. A witness broadcasted to the accident aircraft on VHF frequency 122.4 MHz in order to advise the pilot that it was IMC and unsuitable for flying. No response was received from the accident aircraft; however a response was received from another pilot at Springs Aerodrome on the same frequency. The aircraft radio was destroyed during the impact sequence, thus it could not be determined whether it had been functioning or had been tuned to the correct channel. From documented evidence the investigation concluded that the frequency of the radio in the accident aircraft had been tuned to a different channel, 124.4 MHz, hence the lack of response.

After takeoff, the aircraft flew a left-hand circuit around the aerodrome and the pilot then attempted to land on Runway 03. The wind rendered the landing approach unstable and the pilot aborted the landing and initiated a go-around. The aircraft climbed away in a left-hand orbit with the intention of attempting another landing. On the latter part of the orbit during the turning approach, the aircraft again overshot the centre line of Runway 03 by about 30 m to the right. The aircraft did not touch down, and began a second left-hand orbit, crossing runway 03 from the right at approximately 6 m AGL. During the second left-hand orbit the aircraft pitched up, stalled and crashed into the ground.

3. CONCLUSION

3.1 Findings

- 3.1.1 The pilot was properly licensed and qualified for the flight in accordance with existing regulations.
- 3.1.2 Even though the pilot held an instrument rating, the aircraft was not equipped for instrument flight.
- 3.1.3 The aircraft's Authority-to-Fly certificate was valid at the time of the accident.
- 3.1.4 The maintenance records indicated that the aircraft had been maintained in accordance with existing regulations and approved procedures and that the aircraft was serviceable when dispatched for the flight.
- 3.1.5 There was no evidence of airframe failure or system malfunction prior to the accident.
- 3.1.7 Low lying fog and wind speeds exceeding 10 knots were reported at the time of the accident.
- 3.1.8 The pilot attempted to continue visual flight in instrument meteorological conditions.
- 3.1.9 The aircraft crashed after the second go-around.

3.2 Probable Cause/s

- 3.2.1 The aircraft crashed after the second go-around.

3.3 Contributory Factor/s

3.3.1 Poor visibility due to low lying fog.

3.3.2 Two unstable approaches and unsuccessful landing attempts, due to the strong wind.

4. SAFETY RECOMMENDATIONS

4.1 None.

5. APPENDICES

5.1 Appendix 1: GPS Download.

ZU-ETC

Flight download from Garmin GPSmap 196 s/n 65509063

Data and summary prepared by Peter How 31st August, 2010

Hardware

Garmin portable GPS receiver GPSmap 60CSx, intended for aviation and road use. The internal AA NiCad rechargeable batteries were still quite full. The unit has a facility for an external antenna, which seems to have been connected. This means that the used satellite geometries and dilution of precision will be good, and thus the errors relatively low. The unit was in good condition, with no visible sign of damage and seemed to operate perfectly.

Track logs

There were several track logs, a few of which were from road navigation. The owner had made cross country flights from Henley on Klip and Lanseria and prior to the accident, there were two track logs showing circuits at FASI.

The previous circuit flights at FASI were about 5,5km long and 1,5km wide and the downwind legs were at approximately 220m agl. These flights occurred on 2010-03-27 and 2010-04-17 and included multiple touch and goes.

Tracklog 020 was recorded on 2010-08-21 with a duration of 16 min 8 sec. It was a total of 7,6km long. It started at 06:59:57. Note that the first plot and leg is erroneous, and was probably due to it being an initial 2D position computation at switch on. The following information has been extracted from the track plot and Google Earth images:

The aircraft taxied from the northern hangars, south along runway 22 and onto the extreme southern end of runway 03. The GPS indicates an altitude of 1644m at this point.

After takeoff, the aircraft made a climbing turn to the left, at 1711m ie 67m agl, at the northern end of runway 03.

The aircraft kept within 300m of runway 03 centre line on the downwind leg at about 50 to 60m agl.

A descending right hand turning base leg was initiated when opposite runway 03 threshold. The final part of the turn overshot the centre line and an S-turn had to be performed. At the threshold markings, the aircraft was now parallel to the centerline, but a few metres to the left of the tarmac edge, but at 1658m, ie 14m above the runway.

The aircraft gradually moved to the right towards the centerline and touched down about 200m after the threshold, but in doing so, seemed to veer off to the left by 10 degrees, probably still on the ground. At a point 20m to the left of the tarmac edge, it turned a further 30 degrees to the left and climbed away in a left hand orbit, but never higher than 1669m, ie 25m AGL.

On the latter part of the second orbit, during the turning approach, it again overshot the centre line of runway 03, to the right hand side by at about 30m.

The aircraft did not touch down, and began a second left hand orbit, crossing the runway 03 from

the right at a heading 347 degrees true at 1650m, ie 6m agl. The highest point of this final turn was 1656m, ie 12m agl and the ground speed was now about 7kmh slower than in the first orbit. During the last 10 seconds, the aircraft descended to about 7m agl and the speed increased by 10kmh to 99kmh at impact.

The impact altitude is shown as 1647m, ie 3m above take-off point. The position of impact is shown as S26 15.020 E028 23.536 and it occurred at 07:16:05. Google Earth images indicate that there may have been rising ground just on the outside of the final part of the turn

Files provided

Flight track and vertical profile

Zoomed flight track

Google Earth image with track overlay

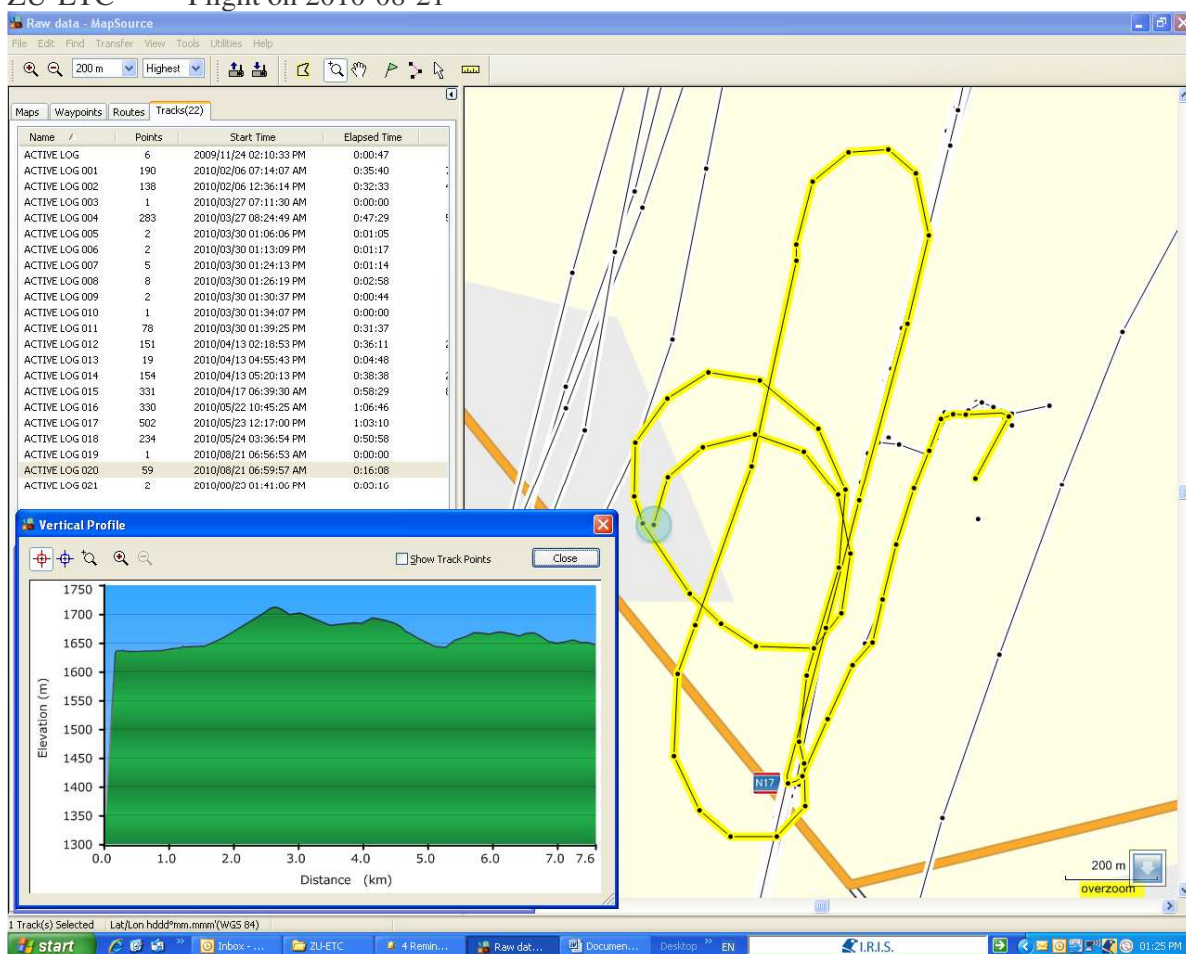
Raw mps data file.

Text file of the entire last flight

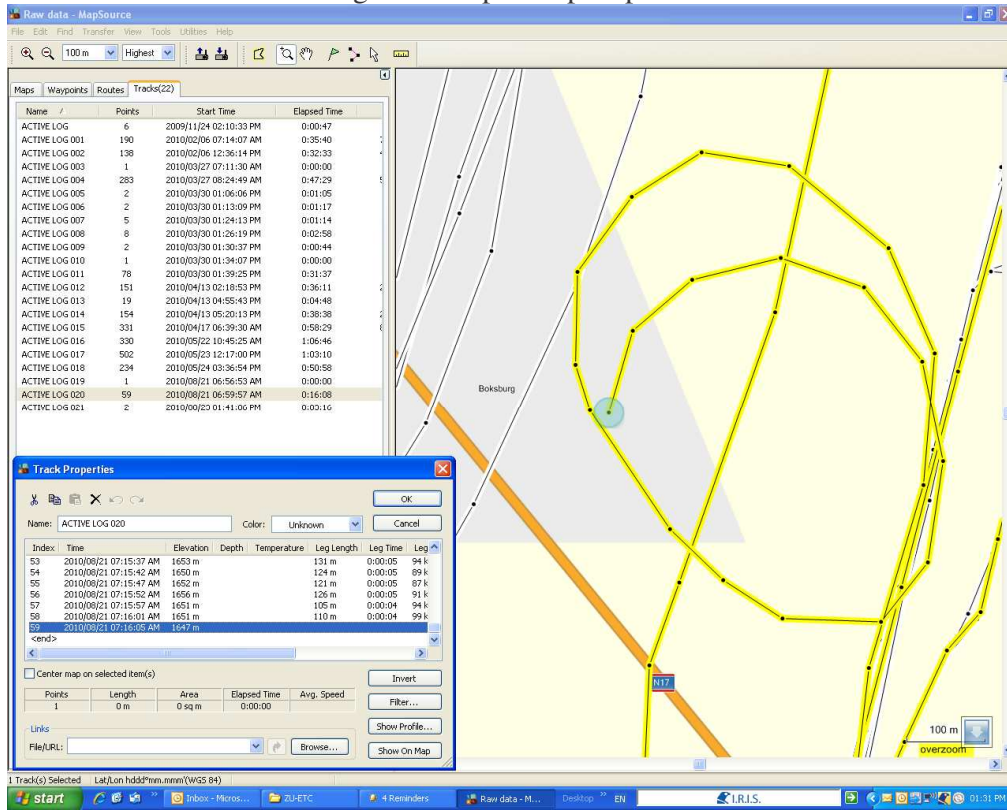
Garmin raw data file.

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ZU-ETC Flight on 2010-08-21



ZU-ETC Zoomed in flight track up to impact point



ZU-ETC flight track on Google Earth

