



## AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference:	CA18/2/3/8525	
<b>Aircraft Registration</b>	ZU-SGG	<b>Date of Accident</b>	30 July 2008		<b>Time of Accident</b>	0945Z
<b>Type of Aircraft</b>	Jabiru J430	(Aeroplane)	<b>Type of Operation</b>		Private	
<b>Pilot-in-command Licence Type</b>		Private	<b>Age</b>	34	<b>Licence Valid</b>	Yes
<b>Pilot-in-command Flying Experience</b>		Total Flying Hours	371.1		Hours on Type	7.1
<b>Last point of departure</b>		Bethlehem Aerodrome (FABM)				
<b>Next point of intended landing</b>		Harrismith Aerodrome (FAHR)				
<b>Location of the accident site with reference to easily defined geographical points (GPS readings if possible)</b>						
4m to the left of Runway 29 at FABM (GPS Position: South 28°14.882' East 028°19.232', elevation 5 561 feet)						
<b>Meteorological Information</b>		Surface wind, 240°/ 7kt, Temperature, 15°C, CAVOK				
<b>Number of people on board</b>	1 + 1	<b>No. of people injured</b>	0 + 1	<b>No. of people killed</b>	0	
<b>Synopsis</b>						
<p>On the morning of 30 July 2008 the pilot, accompanied by a passenger (also a pilot) departed Harrismith Aerodrome en route to Bethlehem Aerodrome. Following an uneventful flight, they landed at Bethlehem Aerodrome.</p> <p>Following their arrival at Bethlehem, the person that was the passenger on the inbound flight, conducted a 54-minute flight test on the aircraft with a flight instructor at Bethlehem Aerodrome. Following the aforementioned flight, the aircraft was refuelled to capacity and 57 litres of 100 LL Avgas was uplifted. The two occupants boarded the aircraft for their return flight to Harrismith Aerodrome. They backtracked along the runway and lined up for take off, Runway 29 with the prevailing wind being from the West. On rotation, the aircraft suddenly lost lift, and the aircraft landed back on the remaining runway length available. It was decided to abort the take-off and maximum braking was applied in an attempt to stop the aircraft on the runway, but braking proved to be inefficient to stop the aircraft before the end of the runway. In an attempt to avoid an overrun of the runway surface and colliding with the perimeter fence, the pilot induced a left turn to try and slow the aircraft down. The aircraft departed the runway to the left and the nose wheel collided with a windrow next to the runway, which was approximately 15 to 20cm in height and located about 4m from the runway edge running parallel to the runway. Following impact with the windrow, the aircraft nosed over and came to rest in an inverted attitude. The windrow came about following maintenance work that had been performed on the runway lights' electrical cabling for which a NOTAM (Notice to Airmen) had been issued. The NOTAM was, however, uplifted the day prior to the accident, being 29 July 2008, indicating that normal operations could resume. Both occupants were taken to a local hospital for a medical examination, following the accident. The passenger suffered from torn ligaments to his chest and the pilot sustained no injuries. The aircraft was substantially damaged. The aircraft had been manufactured in terms of an approved building standard at a CAA approved manufacturing facility. The first Annual Inspection prior to the accident was certified on 5 May 2008 at 1.1 airframe hours. The aircraft had flown a further 46.4 hours since the Annual Inspection was certified. The aircraft had a valid Authority to Fly.</p>						
<b>Probable Cause</b>						
<p>The aircraft collided with a windrow on the left-hand side of the runway, and nosed over following an aborted take-off and departure from the runway surface.</p>						
<b>IARC Date</b>				<b>Release Date</b>		



## AIRCRAFT ACCIDENT REPORT

**Name of Owner/Operator** : GSG Trust  
**Manufacturer** : Shadow Lite CC  
**Model** : Jabiru J430  
**Nationality** : South African  
**Registration Marks** : ZU-SGG  
**Place** : Bethlehem Aerodrome  
**Date** : 30 July 2008  
**Time** : 0945Z

*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 interests 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 the morning of 30 July 2008, the pilot, accompanied by a passenger (also a pilot) departed Harrismith Aerodrome en route to Bethlehem Aerodrome. Following an uneventful flight, they landed at Bethlehem Aerodrome.

1.1.2 The passenger (also a pilot) that was on board the aircraft on the inbound flight from Harrismith to Bethlehem then conducted a flight test on the aircraft with a flight instructor/testing officer at Bethlehem Aerodrome. The duration of the flight was logged as 0.9 flying hours (54 minutes).

1.1.3 The aircraft was then refuelled to capacity and 57 litres of 100 LL Avgas was uplifted. The pilot and his passenger (also a pilot that had just performed a flight

test) prepared for their return flight to Harrismith Aerodrome. They backtracked along Runway 11 and lined up for take off Runway 29, with the prevailing wind being from the west.

- 1.1.4 On rotation, the aircraft suddenly lost lift, and the pilot elected to land back on the remaining available runway, which was according to the pilot past the halfway mark. The take-off was aborted and maximum braking was applied in an attempt to stop the aircraft on the runway length available, but braking proved to be ineffective in stopping the aircraft before the end of the runway, which was 1 175 meters in length.
- 1.1.5 In an attempt to avoid an overrun of the runway surface and colliding with the aerodrome perimeter fence, the pilot induced a left turn to try to slow the aircraft down. The aircraft departed the runway to the left and the nose wheel collided with a windrow next to the runway, which was approximately 15 to 20cm in height and located about 4m from the runway edge running parallel to the runway. Following impact with the windrow, the aircraft nosed over and came to rest in an inverted attitude.
- 1.1.5 The windrow came about following maintenance work that had been performed on the runway lights' cabling for which a NOTAM (Notice to Airmen) had been issued. The NOTAM was, however, uplifted the day prior to the accident, being 29 July 2008.
- 1.1.6 The accident occurred during daylight conditions at a geographical position determined as South 28°14.882' East 028°19.232' at an elevation of 5 561 feet above sea level, which was within the boundaries of the Bethlehem Aerodrome.

## 1.2 Injuries to Persons:

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

## 1.3 Damage to Aircraft:

- 1.3.1 The aircraft sustained substantial damage to the vertical fin, which was found to be cracked and delaminated, the cockpit windows were shattered, the nose landing gear and the left wing strut were bent, and the propeller was also damaged.



**Figure 1.** Indicating damage to the spinner and propeller.



**Figure 2.** Damage to the vertical fin.



**Figure 3.** Visible damage to the left wing strut.

#### 1.4 Other Damage:

- 1.4.1 No other damage was caused.

#### 1.5 Personnel Information:

- 1.5.1 Pilot-in-command:

Nationality	South African	Gender	Male	Age	34
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Licence Type	Private Pilot		
Licence valid	Yes	Type Endorsed	Yes
Ratings	None		
Medical Expiry Date	31 October 2009		
Restrictions	None		
Previous Accident/s	None		

#### Flying Experience:

Total Hours	371.1
Total Past 90 Days	7.1
Total on Type Past 90 Days	7.1
Total on Type	7.1

- 1.5.2 According to the CAA records the pilot's aviation medical certificate had expired on 10 September 2007. During an interview with the pilot, which took place the day after the accident, it was noted that he had a valid aviation medical certificate in his pilot's licence booklet. According to the aviation medical certificate that was in his booklet, it was evident that he had undergone an aviation medical examination on 10 October 2007, during which period he was issued with a new aviation medical certificate, which was valid until 31 October 2009. According to available information (CAA pilot file) the Authority never received a copy of his new aviation medical certificate, which should have been forwarded to the Authority within a 90-day period from the time that his medical certificate was issued as stipulated in Part 61.01.6(6) of the Civil Aviation Regulations of 1997, as amended. The pilot, however, made an effort to forward the certificate as required by utilizing the services of an "outsourced service provider" to deliver the yellow aviation medical certificate copy to the Authority. At the time of the accident, the copy had not yet been delivered.

## 1.6 Aircraft Information:

### 1.6.1 Airframe:

Type	Jabiru J430
Serial Number	538
Manufacturer	Shadow Lite CC
Year of Manufacture	2008

Certification Status	Non Type Certified Aircraft	
Total Airframe Hours (At time of Accident)	47.5	
Last Annual Inspection (Hours & Date)	1.1	5 May 2008
Hours flown since Last Annual Inspection	46.4	
C of A (Issue Date)	8 May 2008	
C of R (Issue Date) (Present owner)	3 April 2008	
Operating Categories	Private	

#### 1.6.2 Engine:

Type	Jabiru 3300
Serial Number	33A 1744
Hours since New	47.5
Hours since Overhaul	T.B.O not yet reached

#### 1.6.3 Propeller:

Type	Sensenich 60"x 55"
Serial Number	AH 3241
Hours since New	47.5
Hours since Overhaul	T.B.O not yet reached

#### 1.6.4 Weight and Balance

	Weight (kg)	Arm (mm)	Moment (kg.mm)
A/C empty weight	396	141	55 836
Pilot	119	-12	-1 428
Fwd Passenger	110	-12	-1 320
Fuel (125L)	90	451	40 590
<b>Total T/O Weight</b>	<b>715</b>	<b>131.0</b>	<b>93 678</b>

The maximum certified take-off weight for the aircraft is not allowed to exceed 700kg as stipulated in the POH (Pilot's operating handbook) Section 6, Weight Control, Pg. 6-8.

The Centre of Gravity (CG) limits are as follows:

Forward CG limit	99mm aft of datum up to & including 600kg 200mm aft of datum @ 700kg
Aft CG limit	277mm aft of datum at all weights
Datum	Wing leading edge

$$\begin{aligned} \text{Centre of Gravity at the time of the accident} &= \text{Total moment} \div \text{weight} \\ &= 93\,678 \div 715 \\ &= 131 \text{ mm aft of the datum} \end{aligned}$$

The aircraft's forward CG envelope was exceeded at take-off for the given load distribution as it was.

According to the weight and balance calculation, the aircraft's maximum allowable take-off mass was exceeded by 15kg (2%) during the attempted take-off from Bethlehem Aerodrome.

## 1.7 Meteorological Information:

### 1.7.1 Weather information as obtained from the pilot's questionnaire;

Wind direction	300°	Wind speed	10 knots	Visibility	CAVOK
Temperature	17°C	Cloud cover	None	Cloud base	None
Dew point	unknown				

### 1.7.2 Weather information obtained from the official weather report from the South African Weather Services.

Wind direction	240°	Wind speed	7 knots	Visibility	CAVOK
Temperature	15°C	Cloud cover	None	Cloud base	None
Dew point	N/A				

## 1.8 Aids to Navigation:

### 1.8.1 A panel-mounted GPS (Global Positioning System) (Garmin 296) was installed on the aircraft.

## 1.9 Communications:

1.9.1 The pilot broadcasted his intention on the VHF frequency 124.8 MHz, which was the local frequency in use at the Aerodrome.

## 1.10 Aerodrome Information:

Aerodrome Location	Bethlehem	
Aerodrome Co-ordinates	South 28°14'55.0" East 028°20'10.0"	
Aerodrome Elevation	5 561 feet AMSL (above mean sea level)	
Aerodrome Status	Licensed	
Runway Designations	11/29	
Runway Dimensions	1 175m x 15m	
Runway Used	Runway 29	
Runway Surface	Asphalt	
Approach Facilities	NDB, Runway lights.	

**NOTE:** Maintenance work was conducted at Bethlehem Aerodrome prior to the accident flight, which required the replacement of the runway light electrical cabling. As a result of the excavations associated with this type of operation the soil was not compressed after the cables were replaced, which resulted in a windrow, which was approximately 15 to 20cm in height and about 4m from the runway edge.

A NOTAM (Notice to Airmen) No. C1141/08 was issued on 28 May 2008, advising all airmen making use of the runway at the Bethlehem Aerodrome, that the runway light would be out of order. A second NOTAM No. 1662/08 was issued on 29 July 2008, informing airmen that normal operation could be resumed.

## 1.11 Flight Recorders:

1.11.1 The aircraft was not fitted with either a cockpit voice recorder (CVR) or a flight data recorder (FDR), nor was it required by regulation.



## 1.12 Wreckage and Impact Information:

1.12.1 The aircraft departed Runway 29 to the left, approximately 40m before the end of the runway surface. Tyre markings on the runway indicate that the left turn induced by the pilot was at an angle of between 45° to 60°. Approximately 4m from the runway edge the nose wheel collided with a windrow approximately 15 to 20cm in height, which caused the aircraft to nose over and come to rest in an inverted attitude, as can be seen in Figure 4 and the next page of this report.



**Figure 4.** A view of the aircraft as it came to rest with the windrow also visible.

## 1.13 Medical and Pathological Information:

1.13.1 Not Applicable.

## 1.14 Fire:

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

## 1.15 Survival Aspects:

1.15.1 The accident is categorized as survivable, as both occupants were properly restrained by making use of the aircraft-equipped safety harnesses, similar to the

those installed in automobiles. The accident was associated with low kinetic forces and as a result the cabin was not damaged, thus the occupants did not sustain any injuries.

#### **1.16 Tests and Research:**

1.16.1 None.

#### **1.17 Organisational and Management Information:**

1.17.1 This was a private flight.

1.17.2 The aircraft was manufactured in terms of an approved building standard at a CAA-approved manufacturing facility.

1.17.3 An Authority to Fly was issued by the CAA on 8 May 2008 with an expiry date of 7 May 2009. The aircraft had flown a total of 47.5 hours since new.

#### **1.18 Additional Information:**

1.18.1 The pilot that was flying the aircraft (ZU-SGG) at the time of the accident was the owner of a Cessna 210G (ZS-EWZ), which he had owned since October 2002. According to his flight logbook records, most of his flying was done on the Cessna 210 (ZS-EWZ) type aircraft (approximately 300 hours). In contrast to the Cessna 210, the pilot had accumulated a total of 7.1 flying hours on the Jabiru J430 type aircraft at the time of the accident.

#### **1.19 Useful or Effective Investigation Techniques:**

1.19.1 None.

## **2. ANALYSIS**

- 2.1 Prior to departure from the Bethlehem Aerodrome, the aircraft was refuelled to capacity without a proper weight and balance calculation having been done. Because of that omission, the pilot was unaware of the actual weight of the aircraft at take-off and also unaware that he had exceeded the maximum take-off weight for the aircraft as stipulated in the POH.
- 2.2 The weight and balance calculation further revealed that the forward CG envelope of the aircraft was also exceeded. This would have had a direct effect on the flight characteristics of the aircraft, which limited the up-elevator effectiveness and thus limited the nose attitude during the climb. The pilot could have perceived or experienced the aircraft to be sluggish as he rotated and therefore the decision by the pilot to abort the take-off and land back. According to the pilot, he landed back on the available runway surface, which was past the halfway mark, which left him with approximately 400 to 500m of runway surface, but it could have been less.
- 2.3 With the aircraft exceeding its maximum certified take-off weight, the pilot applied maximum braking following the decision to abort the take-off. The aircraft's brakes, however, appeared to be ineffective to bring it to a safe stop on the remaining available runway surface.. In an attempt to avoid a runway overrun and colliding with the aerodrome parameter fence, which was approximately 50m past the threshold of Runway 11, the pilot induced a left turn and the aircraft reacted and departed the runway surface to the left. This decision by the pilot was considered to be with good intent, as his first consideration was to avoid any possible damage/injury to a third party, either in the form of people or property. Should he have overran the runway and collided with the parameter fence, the possibility existed that he might have collided with a vehicle(s) due to the fact that a public road was running parallel to the aerodrome parameter fence. He therefore opted to steer the aircraft to the left, as the aerodrome fuel depot as well as several hangars were located to the right of the runway near the threshold of Runway 11. The open area to the left of the runway was considered to be adequate to have brought the aircraft to a safe stop, without damage or injury to people or property. However, the pilot failed to notice/observe the windrow timeously and was therefore unable to take avoidance action, and collided with it.
- 2.4 The decision by the pilot to have aborted the take-off was considered to be the best possible option under the circumstances. Apart from the fact that he could have collided with the parameter fence if had continued along the runway surface and that somebody could have been seriously injured, he also had a residential area straight ahead in his take-off path. Should he have continued with the take-off and

failed to obtain adequate flying speed, resulting in a stall or possible forced landing he was over a residential area, which would have increased the risk of a serious accident even more, not to mention the damage that might have been caused to property.

- 2.5 The windrow that was located approximately 4m from the runway edge came about following aerodrome maintenance, which had been conducted over a period and entailed the replacement of the runway lighting electrical cabling. During the period that work was in progress a NOTAM (Notice to Airmen) was issued, informing airmen/aviators that the runway lights at the aerodrome were out of order. However, the NOTAM at no stage informed airmen of the risk at hand and that the actual runway light electrical cabling was in the process of being replaced. At the time of the accident, the maintenance process had been concluded, with a NOTAM informing airmen that normal operations can be resumed, dated 29 July 2008, which was the day prior to the accident in question.
- 2.6 It is the opinion of the investigating team that if maintenance practices at the aerodrome had been conducted properly, meaning the ground that was excavated during the cable-laying process had been properly flattened and compressed, the accident could have been prevented. If the ground was compacted and flat as it should have been, the aircraft most probably would have been brought to a halt in the open area available, which consisted of a hard gravel surface.

### **3. CONCLUSION**

#### **a) Findings:**

- (i) The pilot was the holder of a valid private pilot's licence (aeroplane) and had the aircraft type endorsed in his logbook.
- (ii) The aircraft had a valid Authority to Fly, and was maintained in accordance with the approved maintenance schedule.
- (iii) The aircraft had been manufactured in terms of an approved building standard at a CAA-approved manufacturing facility.
- (iv) The aircraft had flown 47.5 hours since new.

- (iv) According to the POH (pilot's operating handbook) the aircraft exceeded its allowable maximum take off weight (MTOW) by 15kg at the time of the accident.
- (v) The aircraft's forward CG limit was exceeded during take-off for the given load configuration at the time.
- (vi) Weather conditions were reported to be fine, with the prevailing wind being 240° at 7 knots. Runway 29 was used for take-off.
- (vii) A windrow approximately 15 to 20cm in height and approximately 4m from the runway edge, was present on the left-hand side of Runway 29, following runway lighting cable maintenance that had been completed.
- (viii) The NOTAM that had been issued, indicating the runway light being out of service at FABM was discontinued the day prior to the accident, being 29 July 2008.
- (ix) Due to insufficient runway length available following an aborted take-off, the pilot induced a "ground loop" type manoeuvre and the aircraft veered off the runway to the left.

**b) Probable Cause/s:**

- (i) The aircraft collided with a windrow on the left-hand side of the runway, and nosed over, following an aborted take-off and departure from the runway surface following intervention by the pilot.

**c) Contributory Factor/s:**

- (i) The fact that the aircraft's maximum take-off weight was exceeded on take-off had a significant effect on: (1) the take-off performance of the aircraft (2) the braking effectiveness of the aircraft, following the aborted take-off, which necessitated intervention by the pilot.
- (ii) With the aircraft's CG position being substantially forward during take-off, the aircraft became less responsive to up-elevator control.
- (iii) The limited experience by the pilot on the Jabiru J430 type aircraft might

have led him to apply the incorrect take-off technique, which caused him to end up behind the drag curve and an aborted take-off followed.

- (iv) The runway overrun area was considered to be inadequate to have brought the aircraft to a safe stop.

## 4 SAFETY RECOMMENDATIONS

- 4.1 It is recommended that the CAA, Aerodrome Safety Department engage with the aerodrome licence holder in order to rectify the hazard that existed at the aerodrome at the time and date of the accident. The windrow that came about following maintenance intervention next to the runway, should be properly compacted and flattened to avoid any potential hazard to aircraft that make use of the aerodrome. This recommendation should be dealt with as a matter of urgency.
- 4.2 It is recommended that the CAA, Aerodrome Safety Department, implement a proper oversight programme, which will be required, following routine maintenance at all licensed aerodromes within South Africa. These inspections should be performed whenever maintenance was performed that could have a direct or indirect effect on the safe operation of an aircraft, its occupants and/or cargo.
- 4.3 It is recommended that the CAA, Aeronautical Information Services implement a procedure that ensures when NOTAMs are being issued, that they contain as much information possible, especially when aerodrome maintenance is applicable that might have a direct or indirect effect on the safe operation of an aircraft. Any hazards/risk involved with such maintenance should be clearly highlighted.

## 5. APPENDICES

- 5.1 None

-END-

Report reviewed and amended by the Advisory Safety Panel  
24 February 2009