SOUTH AFRICAN CIVIL AVIATION AUTHORITY

Section/division **Accident and Incident Investigations Division** Form Number: CA 12-12a

AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference:	CA18/2/3/9349		
Aircraft Registration	ZU-FBL	**Date of Accident**	11 August 2014		**Time of Accident**	0700Z	
Type of Aircraft	RAVEN (Aeroplane)		**Type of Operation**		Private		
Pilot-in-command Licence Type	NPL		**Age**	57	**Licence Valid**	Yes	
Pilot-in-command Flying Experience	Total Flying Hours		128,79		Hours on Type	128.79	
Last point of departure	Saldanha Aerodrome (FASD), Western Cape						
Next point of intended landing	Private airstrip on a private farm (New Plaasmol) at Hopefield, Western Cape						
Location of the accident site with reference to easily defined geographical points (GPS readings if possible)							
Hopefield on a private farm (New Plaasmol) airstrip							
Meteorological Information	Wind direction 20°, wind speed: 11 kts; air temperature: 18 ºC; visibility: Good Cloud base: 5000 ft, cloud coverage: 3/8						
Number of people on board	1+1	**No. of people injured**	0	**No. of people killed**	0		

Synopsis

During approach for a landing at Runway 15 at the private airstrip while flying at a low level, the pilot conducted a runway inspection. The pilot stated that the aircraft experienced slight turbulence followed by a loss of height. The left wing tip and the left main landing gear clipped some treetops, after which the pilot lost control of the aircraft and impacted the ground hard.

The aircraft sustained substantial damage to the undercarriage, wings and propeller. The pilot and his passengers were not injured during the accident sequence.

The investigation found that the cause of the accident was disregard of the standard operational procedures during the low-level flight while performing the runway inspection.

Probable Cause

The aircraft lost height during a runway inspection and clipped some treetops while trying to avoid hitting with the ground.

Contributory Factors

1. Disregard of standard operating procedures
2. Poor technique/ airmanship

IARC Date		Release Date	

AIRCRAFT ACCIDENT REPORT

Name of Owner	**:** Rogers C F
Name of Operator	**:** Rogers C F
Manufacturer	**:** BABST C F
Model	**:** RAVEN
Nationality	**:** South African
Registration Marks	**:** ZU-FBL
Place	**:** Hopefield on a private farm (New Plaasmol) airstrip
Date	**:** 11 August 2014
Time	**:** 0700Z

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

1. FACTUAL INFORMATION

1.1 History of Flight

1.1.1 The aircraft was on approach for landing at the farm on a private airstrip (Runway 15). The pilot first conducted a runway inspection. The pilot stated that during the second approach for runway inspection, while flying approximately 50 ft above ground level (AGL), the aircraft experienced turbulence and lost height. Both the left main landing gear and the left wing of the aircraft clipped some treetops 300 m before the threshold. During contact with the trees the aircraft turned 270 degrees anticlockwise and the pilot lost control.

Figure 1: Aircraft flight route prior to accident

1.1.2 The aircraft impacted the ground on bushy terrain and came to stop 34 m left of the runway. The aircraft sustained substantial damage to the undercarriage, wings and propeller. The accident occurred in daylight conditions on a private airstrip with GPS readings S 33º 02' 08.27", E 18º 17' 42.04" at an elevation of 330 ft.

1.2 Injuries to Persons

1.2.1 The pilot and his passenger sustained no injuries

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

1.3 Damage to Aircraft

1.3.1 The aircraft sustained substantial damage to the undercarriage, wings and propeller.

Figure 2 shows the aircraft damage as it came to a stop after the accident.

Figure 2: The aircraft as it came to rest

1.4 Other Damage

1.4.1 The damage was limited to vegetation around the area were the aircraft crashed.

1.5 Personnel Information

Nationality	South African	Gender	Male	Age	58
Licence Number	02790117388	Licence Type	National Pilot Licence		
Licence valid	Yes	Type Endorsed	Yes		
Ratings	Light Sport Aeroplane				
Medical Expiry Date	30 September 2015				
Restrictions	Standby corrective lenses or glasses				
Previous Accidents	None				

Flying Experience:

Total Hours	128,79
Total Past 90 Days	11,91
Total on Type Past 90 Days	11,91
Total on Type	128,79

1.6 Aircraft Information

Airframe:

Type	Raven	
Serial Number	CF2007/03	
Manufacturer	BABST C F	
Date of Manufacture	2007	
Total Airframe Hours (At time of Accident)	218,96	
Last Annual Inspection (Date & Hours)	26 September 2013	186,9
Hours since Last Annual Inspection	32,06	
C of A (Issue Date)	2 October 2013	
C of A (Expiry Date)	25 September 2014	
C of R (Issue Date) (Present owner)	8 October 2008	
Operating Categories	NTCA	

Engine:

Type	Rotax 912 UL
Serial Number	4408824
Hours since New	218,96
Hours since Overhaul	TBO not yet reached

Propeller:

Type	GSC 3BL WOOD
Serial Number	B600
Hours since New	218,96
Hours since Overhaul	TBO not yet reached

1.6.1 Aircraft documentation (such as maintenance records, certificates and service bulletin letters) where studied and reviewed. The information provided indicates that the aircraft was equipped and maintained in accordance with existing regulations. All service bulletins published by the engine and aircraft manufacturer were adhered to by the AMO.

1.6.2 There was no recorded defect of any of the aircraft systems or components prior to the flight.

1.7 Meteorological Information

1.7.1 The meteorological information as obtained from the pilot questionnaire

Wind direction	20º	Wind speed	11 knots	Visibility	Good
Temperature	18 ºC	Cloud cover	3/8	Cloud base	5000 ft
Dew point	None				

1.7.2 According to the airstrip layout, the aircraft was flying with a left crosswind during the approach for a precautionary runway inspection.

1.8 Aids to Navigation

1.8.1 The aircraft was equipped with the standard factory-fitted navigational equipment approved by the Regulator. There were no recorded defects to navigational equipment prior to flight.

1.9 Communications

1.9.1 The aircraft was equipped with one VHF (very high frequency) radio approved by the Regulator. There were no recorded defects regarding the communications equipment prior to flight.

1.10 Aerodrome Information

1.10.1 The private airstrip is the old tar road and is about 650 m long. The grass is kept short on the side for visibility. The table below contains the details of the private airstrip.

Aerodrome Location	Western Cape on a private farm (New Plaasmol) at Hopefield
Aerodrome Co-ordinates	S 33º 02' 08.27", E 18º 17' 42.04"
Aerodrome Elevation	330 ft
Runway Designations	15/33
Runway Dimensions	650 m/5 m
Runway Used	15
Runway Surface	Tar
Approach Facilities	None

NB: Refer to 1.18.2 for a more detailed description of the runway

Figure 3: The accident site

1.11 Flight Recorders

1.11.1 The aircraft was not equipped with a flight data recorder or a cockpit voice recorder. Neither recorder was required by the relevant aviation regulations.

1.12 Wreckage and Impact Information

1.12.1 The aircraft accident occurred on a bushy area on a private farm New Paasmol near Hopefield. The runway is surrounded by trees, which can cause aerodynamic changes.

Figure 4: Damage to the right wing

1.12.2 The pilot stated that during pullout the aircraft experienced turbulence and lost height, and subsequently veered towards the left and clipped the treetops with both the left main landing gear and the left wing. The aircraft turned 270 degrees anticlockwise, the pilot lost control and the aircraft impacted with the bushy terrain and came to halt 34 m to the left edge of the runway.

Figure 5: Damage to the wooden propeller

1.12.3 The aircraft sustained substantial damage to all landing gear, the propeller, wings and fuselage structure. The damage to the propeller is consistent with the engine producing power during impact. All damage to the aircraft was accounted for as the result of high impact forces.

1.13 Medical and Pathological Information

1.13.1 None

1.14 Fire

1.14.1 There was no pre or post-impact fire during the accident sequence.

1.15 Survival Aspects

1.15.1 The aircraft accident was considered survivable, as the pilot was not harmed during the accident sequence.

1.16 Tests and Research

1.16.1 No tests were carried on any of the aircraft components and system after the accident.

Figure 6: Picture 1 of aircraft approach prior to accident

Figure 7: Picture 2 of aircraft approach prior to accident

1.16.2 The above photos were taken during the second reported runway inspection approach prior to the accident. The aircraft is observed flying at a low height, in close proximity to the ground - lower than the surrounding treetops.

1.16.3 The eyewitness who was at the farm when the accident occurred describes the accident as follows.

ñThe touchdown area on the western side has several bushes about 60-70 m from the white stripe touchdown area marked for landing. The aircraft did a flyover inspection and on second approach near the beginning of the runway I took the two photos marked picture 1 & 2 *(referred to as figure 6 and 7 in 1.18.1*). I noticed the aircraft did a sudden drop and I could hear the engine picking up revs to pull up.ò

NB: The words in italics merely serve to clarify some of the information already given in the body of the report. Nothing was subtracted from the original witness statement.

ñThe next minute the aircraft veered to the left and it seemed to touch the bushes with the left wing and undercarriage. It seemed that aircraft was spinning and it disappeared from my view behind the bushes. I started running to the crash area and when I reached it I found pilot to be safe. The aircraft was seriously damaged as per photos attached. On arrival I asked what happened and pilot confirmed my suspicion that there was a downdraft. There are several very high trees that cause unsuspected changes in wind directions over the whole area of Hopefield and around our area it is the same.ò

1.17 Organisational and Management Information

1.17.1 This was a private flight.

1.17.2 The aircraft was maintained by RASSA-approved personnel in accordance with existing regulations.

1.18 Additional Information

1.18.1 Crosswind components

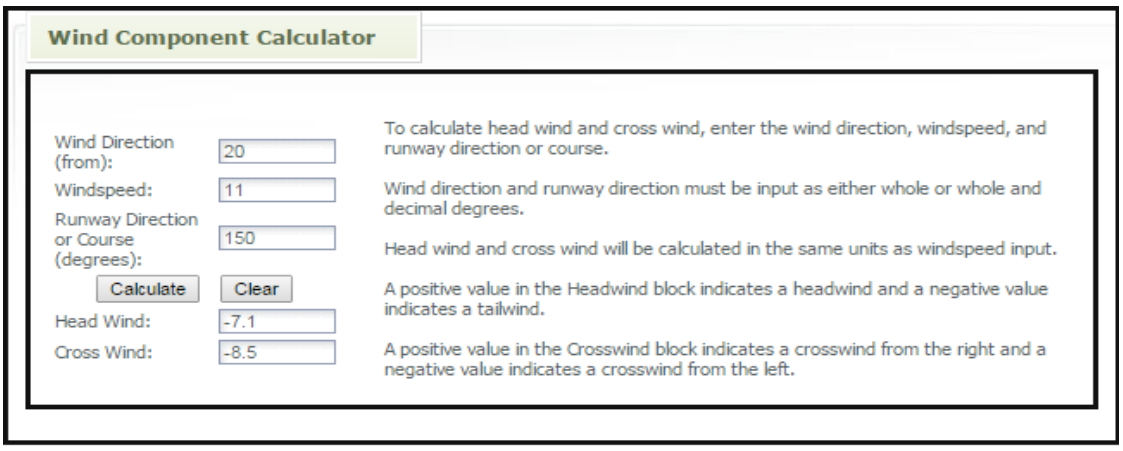
The following information was extracted from: Air Flying Pilotôs Training Manual Volume 1

Crosswind strength

The crosswind component on a runway can be estimated from the wind strength and the angle that the wind direction makes with the runway.

As a rough guide:

- *A wind 30° off the runway heading has a crosswind component of ½ the wind strength*
- *A wind 45° off the runway heading has a crosswind component of ¾ the wind strength*
- *A wind 60° off the runway heading has a crosswind component of Õ the wind strength (nearly all);*
- *A wind 90° off the runway is all crosswind*



When winds are not parallel to or directly with/against the line of travel, the wind is said to have a crosswind *component*; that is, the force can be separated into two vector components, a crosswind component and a headwind or **tailwind component.**

A tailwind component calculation was determined using a system-generated calculator as show above.

The crosswind component is computed by multiplying the wind speed by the sine of the angle between the wind and the direction of travel. For example, a 10-knot wind coming at 45 degrees from either side will have a crosswind component of 10 knots × sin(45°) or approximately 7.07 knots. The headwind component is computed in the same manner, using cosine instead of sine. To determine the crosswind component in real world flight, aviators frequently refer to a monograph chart on which the wind speed and angle are plotted, and the crosswind component is read from a reference line. Direction of travel relative to the wind may be left or right, up or down, or oblique; moving non-parallel to the wind's direction creates a crosswind component on the object and thus increases the apparent wind on the object; such crosswind travel is used to advantage by sailing craft, kiteboarding craft, power kiting, etc. Smaller aircraft are often not limited by their ability to land in a crosswind, but their ability to taxi safely prior and post-flight.

The crosswind will try to weathercock the plane into the wind because of the large keel surfaces behind the main wheels. To avoid the wind from pushing the plane while flying with the tailwind hemisphere, control the plane out of the wind. During the approach for runway inspection, the aircraft was flying with a quartering tailwind component. The aviation rules encourage pilots to take off and land into the wind.

1.18.2 The precautionary runway inspection approach is the safe practice that aircraft pilots perform prior to landing.

The information below was extracted from: The Air Pilotôs Manual, Flying Training 1, Exercise 17b, Page 309

Several inspection runs should be made in the precautionary configuration and a circuit pattern and circuit height established. With no restriction, a normal circuit pattern should be suitable. In bad weather, a low and tight circuit (500 ft) AGL may be advisable. The heights at which the circuits are flown and the number of inspection runs carried out depend on the situation. Command decisions must be made by the pilot.

The low flying checks should be completed before descent to a low level. It is good airmanship to keep workload to a minimum in low-level flight. Flying low to inspect a surface means accurate flying and a good lookout. Keep the aeroplane in trim or, if anything, trim slightly nose-up so that aeroplane will have no tendency to descend while your attention is directed outside.

Three Inspection Circuits: If there are no time, fuel or weather restrictions and three inspection circuits are considered necessary, a suitable plan might be:

Circuit 1: At 1000 ft AGL to establish circuit and note landmarks and magnetic headings.

Circuit 2: To select and make a preliminary evaluation of the actual landing path. Descend on final and make a 500 ft AGL run slightly right of the landing path to give you a good view of the approach path and the landing surface out of your left cockpit window. Search for large obstacles and obstructions, ditches, animals, wires, fence, etc. Return to circuit height

as you are near the end of the field.

Circuit 3: Descend to final and make a run to the right of and along the landing path at a lower, but still safe, level (say 100 or 50 ft) AGL for a closer inspection of the landing surface itself.

Circuit 4: A normal circuit followed by a short field landing. Make each inspection run alongside the selected landing path at a constant height and not as a slow descent that necessitates a frantic climb at the far boundary to avoid obstacles.

The information below was extracted from the CAR of 2009 Part 91.

Minimum flight altitudes

91.07.2 (1) No pilot shall operate an aircraft at altitudes below ï

(a) altitudes, established by the owner or operator, which provide the required terrain clearance, taking into account the operating limitations referred to in Subpart 8; and

(b) the minimum altitudes referred to in Subpart 6; except when necessary for take-off and landing.

(2) The method of establishing minimum flight altitudes referred to in sub-regulation

(a) is prescribed in Document SA-CATS 91

(3) Where the minimum flight altitudes established by the appropriate authority of a foreign State are higher than the minimum flight altitudes prescribed in this regulation, the minimum flight altitudes established by such appropriate authority shall apply in respect of a South African registered aircraft flying in the airspace of the foreign State concerned.

1.19 Useful or Effective Investigation Techniques

1.19.1 None

2. ANALYSIS

2.1 The pilot was qualified for the flight in accordance with existing regulations.

2.2 The action of the pilot during the low-level runway inspection shows overconfidence.

2.3 The aircraft was maintained and equipped in accordance with existing regulatory procedures.

2.4 The prevailing weather conditions with an air speed of 11 knots and a wind direction of 20 degrees subjected the aircraft to a negative crosswind which was more of a

left quartering tailwind. The pilot should have made an approach via runway 34, which had a right quartering headwind. A left quartering tailwind will tend to push the tail in an anticlockwise direction. The pilot will at times compensate for the uncommanded manoeuvre of the aircraft turning to the left by using the right rudder to keep it on a straight and level path.

2.5 The pilot stated that he was flying at a height of 50 ft at the time he was conducting the runway inspection. According to the pictures taken then by the witness, the aircraft position, height and configuration were more of a ready-to-land nature. When conducting a runway inspection, pilots should fly on the right-hand side of the runway at a safe height to enable them to assess the field, check for any foreign object or any activities (animals) on the intended landing runway. However, the pilot stated that he was conducting runway inspection.

2.6 With the pilot flying at close proximity to the surface below the treetops while conducting a runway inspection, he was risking the chance of losing height, making it difficult to recover the aircraft (if necessary). The airflow will tend to be turbulent due to trees on the side of the runway. The photos show clearly that the aircraft was flying at a height lower than the reported 50 ft, which would not allow the pilot to do a proper inspection either; keeping the aircraft on a straight and level path would be a more pressing concern.

2.7 Although the airstrip was on a private farm and it was necessary to conduct runway inspection, the pilot made a steep descent during the second approach and the turbulence due to the trees along the runway caused the aircraft to lose height. The pilot pulled the aircraft out too hard to avoid hitting the ground and tried to turn it into the wind (left) to gain lift. The aircraft then slipped to the left toward the trees close to the side of Runway 15. The aircraft clipped the treetops with both the left wing and the undercarriage; the pilot lost control and crashed the aircraft.

2.8 It is therefore the investigatorôs opinion that in adopting this type of approach when conducting the runway inspection ï combining a downwind approach with flying below the treetops ï the pilot failed to consider the possibility of turbulence due to the trees. Because of the tailwind, the pilot was unable to recover the aircraft during the sideslip.

3. CONCLUSION

3.1 Findings

3.1.1 The pilot was qualified for the flight in accordance with existing regulations.

3.1.2 The aircraft was maintained and equipped in accordance with existing regulations.

3.1.3 The aircraft had a valid certificate of registration and a certificate of authority to fly.

3.1.4 The prevailing weather was also considered a factor contributing to the aircraft accident.

3.1.5 The height at which the pilot was flying above ground level was not safe for the circumstances that prevailed at the time of the accident.

3.1.6 The pilot was too low to conduct runway inspection of an environment surrounded by trees of such height.

3.1.7 The pilot disregarded the standard operational procedures during runway inspection on a private air strip

3.2 Probable Cause/s

3.2.1 The aircraft lost height during a runway inspection and clipped some treetops while trying to avoid hitting the ground.

3.3 Contributory Factors

3.3.1 Disregard of standard operational procedures

3.3.2 Poor technique/ Airmanship

4. SAFETY RECOMMENDATIONS

4.1 The regulator must edge the flight operators at the unmanned airfield to observe the standard operation procedure for flight safety operations. As evident to the height at which the aircraft was flying during the alleged runway inspection, the pilot could have not been able to seen anything on the runway at the time.

5. APPENDICES

5.1 None