

SOUTH AFRICAN



Section/division

Accident and Incident Investigations Division

Form Number: CA 12-12a

AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference:	CA18/2/3/9256	
Aircraft Registration	ZS-DLF	Date of Accident	22 December 2013		Time of Accident	13:10Z
Type of Aircraft	Robinson – R22 Beta		Type of Operation	Private		
Pilot-in-command Licence Type		CPL	Age	22	Licence Valid	Yes
Pilot-in-command Flying Experience		Total Flying Hours	230		Hours on Type	80
Last point of departure		Grand Central Airport (FAGC), Gauteng				
Next point of intended landing		Grand Central Airport (FAGC), Gauteng				
Location of the accident site with reference to easily defined geographical points (GPS readings if possible)						
An open field near a quarry 3 nm south-west of FAGC (GPS S26° 02' 17" E028° 07' 27")						
Meteorological Information		Surface wind 030° at 06 knots, visibility > 10 km, clouds scattered at 2000 ft., temperature 27°, dew point 07° QNH 1024				
Number of people on board	1+0	No. of people injured	1	No. of people killed	0	
Synopsis						
<p>A pilot hired an aircraft for a navigation exercise which included routing to Johannesburg CBD and coming back to Grand Central's Helicopter General Flying Area (HGFA). On arrival at the HGFA the pilot proceeded to descend to 2m above ground level (AGL) with the intention to hover taxi before returning to FAGC. Pilot stated that a few minutes into the hover taxi as he was trying to land, the aircraft started to descend at a higher rate than expected. He tried to recover by pulling the collective, but was unsuccessful in arresting its descent.</p> <p>The aircraft impacted the ground and broke the forward part of the skids. The resultant forces then pushed the aircraft back into the air and coming back, its final impact was on its right-hand side. The pilot suffered minor injuries and the aircraft sustained damage to the tail boom, windscreen, main rotor and drive belts.</p> <p>The investigation revealed that the pilot lost control during hover taxiing.</p>						
Probable Cause						
<p>Poor Technique/Airmanship (The pilot loss of control of the helicopter which resulted at low altitude while trying to land)</p>						
SRP Date			Release Date			

CIVIL AVIATION
AUTHORITY

AIRCRAFT ACCIDENT REPORT

Name of Owner : Aviation Towards Success (ATS)
Name of Operator : Aviation Towards Success (ATS)
Manufacturer : Robinson
Model : R22 Beta
Nationality : South African
Registration Marks : ZS-DLF
Place : Midrand
Date : 22 December 2013
Time : 13:10Z

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

Purpose of the Investigation:

In terms of Regulation 12.03.1 of the Civil Aviation Regulations (2011) this report was compiled in the interest of the promotion of aviation safety and the reduction of the risk of aviation accidents or incidents and not to 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 A pilot, sole occupant, hired a Robinson R22 belonging to Aviation Towards Success (ATS) to fly around Johannesburg and Grand Central's Helicopter General Flying Area (HGFA) to accumulate hours on the aircraft type. HGFA is located 5.9km south of Grand Central Airport (FAGC) at an elevation of 4918 feet AMSL. He stated that he had a full tank of AVGAS and did the pre-flight inspection and found no abnormalities.

1.1.2 He got airborne at 11:30Z and flew straight to Johannesburg. The whole flight lasted approximately 01:40 while he performed a number of exercises. When he was done flying around Johannesburg, he returned to Grand Central's HGFA for one more exercise. According to the pilot, he was going to hover taxi at approximately 2m or higher above ground level (AGL).

1.1.3 In his statement, the pilot states that while hovering and trying to land he realised that the aircraft was losing height rapidly as if it had no power. He attempted to save the situation by pulling up the collective, but the aircraft continued to lose height. It impacted the ground with the forward part of the skids, which broke off. It then bounced back into the air and came back down impacting the ground on its right hand side.

1.1.4 The aircraft, which had no doors, was substantially damaged. The windscreen was broken, the tail boom was struck by the main rotor and both drive belts were severed in half. The cockpit suffered minor damages and the pilot suffered minor injuries.

1.2 Injuries to Persons

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

1.3 Damage to Aircraft

1.3.1 The aircraft was substantially damaged in the accident.

1.4 Other Damage

1.4.1 There was no damage to a third party.

1.5 Personnel Information

Nationality	South African	Gender	Male	Age	22
Licence Number	027 237 8308	Licence Type	Commercial		
Licence valid	Yes	Type Endorsed	Yes		

Ratings	Night Rating
Medical Expiry Date	31 August 2014
Restrictions	None
Previous Accidents	Unknown

Flying Experience:

Total Hours	230
Total Past 90 Days	20
Total on Type Past 90 Days	20
Total on Type	80

1.6 Aircraft Information

1.6.1 The Robinson R22 helicopter is a two-seater, light utility helicopter powered by a horizontally mounted, rearward facing Lycoming four-cylinder reciprocating piston engine.

Airframe:

Type	R 22 Beta	
Serial Number	4149	
Manufacturer	Robinson Helicopter Company	
Date of Manufacture	2007	
Total Airframe Hours (At time of Accident)	3335,6	
Last MPI (Date & Hours)	06/11/2013	3300
Hours since Last MPI	35,6	
C of A (Issue Date)	03/07/2007	
C of R (Issue Date) (Present owner)	19/11/2010	
Operating Categories	Private	

Engine:

Type	Piston
Serial Number	L-40452-36A
Hours since New	3335,6
Hours since Overhaul	1227

1.7 Meteorological Information

Wind direction	030°	Wind speed	06	Visibility	10 km
Temperature	27°	Cloud cover	SCT	Cloud base	2000ft.
Dew point	07°				

1.8 Aids to Navigation

1.8.1 The aircraft was fitted with standard navigational equipment as approved at the time of certification by the regulator. No defects were recorded or reported prior to or during the accident flight.

1.9 Communications

1.9.1 The aircraft was equipped with standard communication systems and none was reported unserviceable prior to the accident. The pilot was listening out to FAGC tower on frequency 124,4 Mhz. at the time of the accident.

1.10 Aerodrome Information

Accident site	3nm south west of FAGC	
Site Co-ordinates	GPS S26° 02' 17" E028° 07' 27")	
Site Elevation	4940 ft. AMSL	
Runway Designations	N/A	N/A
Runway Dimensions	N/A	N/A
Runway Used	N/A	
Runway Surface	N/A	
Approach Facilities	N/A	

1.10.1 The accident did not happen on an aerodrome, but on an open field with low vegetation.

1.11 Flight Recorders

1.11.1 The aircraft was not fitted with a cockpit voice recorder (CVR) or a flight data

recorder (FDR), and neither was required by regulations to be fitted to this type of aircraft and operation.

1.12 Wreckage and Impact Information

1.12.1 The pilot stated that he was trying to “hover taxi”, and when he was descending to land the aircraft descended at a high rate. He realised that he could not control the aircraft, as if the aircraft had no power. The aircraft then impacted the ground, bounced back into the air and hit the ground again with the forward part of the landing skids.

1.12.2 During the impact the main rotor blades flexed up in a coning fashion indicating that the rate of descent was high. The rotor blades and windscreen were completely destroyed in the accident. The front part of both skids broke off and the drive belts were severed after the aircraft came to rest. The aircraft did not have any doors, hence the pilot’s face was bruised by the ground. The instrument column suffered minor damage and all the debris was found approximately 4m from the aircraft as seen in Figure 1.



Figure 1

1.13 Medical and Pathological Information

1.13.1 The pilot only suffered minor bruises from the accident and did not require any

medical attention.

1.14 Fire

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

1.15 Survival Aspects

1.15.1 The accident was survivable since no part of the restraining harnesses the pilot was wearing broke.

1.16 Tests and Research

1.16.1 None

1.17 Organisational and Management Information

1.17.1 The aircraft was used by the operator to train its students, and when available it would be hired to qualified pilots who wanted to build hours.

1.17.2 There are terms and conditions of hire which every client must read and understand. Paragraph 4 refers to the condition of an aircraft and states that acceptance of delivery of the aircraft by the hirer shall be deemed to be acknowledgement by the hirer that the aircraft is in good working order and is in every way satisfactory.

1.18 Additional Information

1.18.1 None

1.19 Useful or Effective Investigation Techniques

1.19.1 None

2. ANALYSIS

- 2.1** The pilot, who was properly qualified and medically fit, hired the helicopter with the aim of building hours and keeping his CPL current. He did his pre-flight and was satisfied that all was in order. According to the pilot, his pre-flight checks and take-off from Grand Central were uneventful.
- 2.2** The flight under the TMA and in uncontrolled airspaces lasted approximately 01 hr 30 min before proceeding to a Helicopter General Flying (HGF) area which is 5.9km south of FAGC. While operating in the HGF the pilot was listening/monitoring FAGC tower frequency 124.0MHz.
- 2.3** The last exercise that he was engaged in was hover taxiing, which the pilot said he performed at approximately 2 meters above ground or higher. It is not clear how long he hover taxied, but he stated that when he decided to land the helicopter, it descended at a higher rate than normal. It felt as if the aircraft had no power, and he tried to recover by pulling up the collective. The helicopter continued to descend rapidly and struck the ground with the front of the skids, indicating that the aircraft was in a nose down attitude. The front of the skids broke off, resulting in an accident sequence that damaged the main rotor, tail boom, and windscreen and tore the V-belts in half due to the clutch actuator not disengaging.
- 2.4** During the hover exercise the helicopter seems to have developed a vortex ring state, which according to the definition is characterised by an unstable condition in which the helicopter experiences uncommanded pitch and roll oscillations, has little or no collective authority and achieves a rate of descent that may approach 6000 feet per minute (fpm) if allowed to develop. This is supported by the pilot's explanation of events before he crashed. See Annexure A.
- a) There was a higher than normal rate of descent (***the upward coning of the main rotor blades on Figure 1 supports this descent rate***)
 - b) Raising the collective to reduce impact forces had no effect.
 - c) He had power, but the aircraft behaved as if it had no power – hence the statement “settling with power”.

3. CONCLUSION

3.1 Findings

- 3.1.1** The pilot held a valid medical certificate and Commercial Pilot Licence (CPL) at the

time of the accident.

- 3.1.2 The purpose of the flight was for the pilot to build hours and to maintain currency of his CPL.
- 3.1.3 The pilot confirmed in his statement that the weather had no bearing on this accident, since the wind was light and variable and visibility greater than 10 km.
- 3.1.4 The aircraft was operated without doors, which according to the aircraft's Pilot Operating Handbook (POH) was acceptable during VFR operations.
- 3.1.5 Since the doors had been removed and the aircraft ended up resting on its side, the pilot suffered minor injuries to his face.
- 3.1.6 There was no evidence of airframe failure or system malfunction prior to the accident. The damage to the main rotor, tail boom, windscreen, landing skids and the severing of both V-belts were attributed to the severe impact forces.
- 3.1.7 The severed V-belts were inspected and found to have been in acceptable condition; they did not show any severe wear and tear.
- 3.1.8 The clutch actuator extended beyond factory pre-set values, which is what caused the V-belts to be severed in half.

3.2 Probable Cause/s

- 3.2.1 Poor technique/airmanship. The pilot loss of control of the helicopter which resulted at low altitude while trying to land

3.3 Contributing factor

- 3.2.1 None

4. SAFETY RECOMMENDATIONS

- 4.1 None

5. ANNEXURES

- 5.1 Annexure A; Pilot statement taken from pilot questionnaire
- 5.2 Annexure B; Robinson R22 Pilot handbook. Emergency procedures
- 5.3 Annexure C; Hire and fly register

Annexure A

DESCRIPTION OF OCCURRENCE : *Was Hover baring to land, when started to descent to land (2 meters) realised I could not control the rate of descent as if i had no power, causing me to hit into the ground bouncing me back up where I tried again to control stability, but as before had no power causing me to sbrike the ground again and rolled over as the skids of the helicopter got stuck in the ground.*

SKETCH :

Name (Print):

Signature:

Annexure B

POWER FAILURE ABOVE 500 FEET AGL

1. Lower collective immediately to maintain RPM and enter normal autorotation.
2. Establish a steady glide at approximately 65 KIAS (See "Maximum Glide Distance Configuration", page 3-3).
3. Adjust collective to keep RPM in green arc or apply full down collective if light weight prevents attaining above 97%.
4. Select landing spot and, if altitude permits, maneuver so landing will be into wind.
5. A restart may be attempted at pilot's discretion if sufficient time is available (See "Air Restart Procedure", page 3-3).
6. If unable to restart, turn off unnecessary switches and shut off fuel.
7. At about 40 feet AGL, begin cyclic flare to reduce rate of descent and forward speed.
8. At about 8 feet AGL, apply forward cyclic to level ship and raise collective just before touchdown to cushion landing. Touch down in level attitude with nose straight ahead.

NOTE

If power failure occurs at night, do not turn on landing lights above 1000 feet AGL to preserve battery power.

POWER FAILURE BETWEEN 8 FEET AND 500 FEET AGL

1. Takeoff operation should be conducted per the Height-Velocity Diagram in Section 5.
2. If power failure occurs, lower collective immediately to maintain rotor RPM.
3. Adjust collective to keep RPM in green arc or apply full down collective if light weight prevents attaining above 97%.
4. Maintain airspeed until ground is approached, then begin cyclic flare to reduce rate of descent and forward speed.
5. At about 8 feet AGL, apply forward cyclic to level ship and raise collective just before touchdown to cushion landing. Touch down with skids level and nose straight ahead.

Annexure C:

PLEASE NOTE YOU WILL PAY PASSENGER LEVIES PER PASSENGER

FLT	A/C REG	DATE	PILOT NAME	TIME OUT	TIME IN	EXACT ROUTE	NO. PAX	STAR TS	W&B	DUAL CHECK EXPIRY	MEDICAL EXPIRY	EXPIRY	PILOT SIGNATURE	HOBBS START	HOBBS STOP	TOTAL HRS	PILOT SIGNATU
1	DLE	21/12/13	Traus	11:30		EAGL-FAGL	0	1	✓	20/03/14	31/10/14		<i>Traus</i>				
2																	
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