



AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference:	CA18/2/3/8861	
Aircraft Registration	ZS-RNN	Date of Accident	02 November 2010	Time of Accident	1430-1500Z	
Type of Aircraft	Robinson R22 Beta		Type of Operation	Private		
Pilot-in-command Licence Type		Commercial Helicopter	Age	38	Licence Valid	Yes
Pilot-in-command Flying Experience		Total Flying Hours	396.4		Hours on Type	Unknown
Last point of departure		Wonderboom Airport(FAWB) - Gauteng Province				
Next point of intended landing		Wonderboom Airport(FAWB) - Gauteng Province				
Location of the accident site with reference to easily defined geographical points (GPS readings if possible)						
House No. 78 Second Street, Rooiwal Approximately 5NM north of FAWB. GPS coordinates: S25° 33.526 E028° 14.862						
Meteorological Information		Surface wind: 300/03knots; Temperature: 29° C; Dew point: 09°C				
Number of people on board	1 + 1	No. of people injured	0	No. of people killed	2	
Synopsis		<p>The helicopter was flown from FAWB to the GFA with the intention to land back at FAWB when the accident occurred. According to eyewitnesses, they saw the helicopter flying very low in a southerly direction towards FAWB. The helicopter impacted a tree and yawed to the left, descended at an angle of approximately 45 degree and crashed at the back yard of a house in the residential area.</p> <p>The helicopter was destroyed by fire and both occupants were fatally injured.</p> <p>The investigations revealed that the engine was not operating when it impacted the ground.</p>				
Probable Cause						
<p>The helicopter impacted a tree during low level flying over build-up area and crashed into a yard.</p> <p>Contributory factor: Inoperative engine during low level flying.</p>						
IARC Date				Release Date		



AIRCRAFT ACCIDENT REPORT

Name of Owner/Operator : Black Panther Family Trust
Manufacturer : Robinson Helicopter Company
Model : R22 BETA
Nationality : South African
Registration Marks : ZS-RNN
Place : House No. 78 Second Street, Rooiwal GPS coordinates
 S25° 33 526 E028° 14 862
Date : 02 November 2010
Time : 1430-1500Z

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 02 November 2010 at 1213Z a Robinson R22, ZS-RNN landed at Wonderboom Airport (FAWB) from Lanseria International Airport (FALA) with two occupants on-board the helicopter. The helicopter then took off again from FAWB to the general flying area (GFA), with the intention of landing back at FAWB. The flight was conducted in preparation towards the renewal of the owner's private pilot licence (PPL) on the helicopter type which had expired.
- 1.1.2 According to FAWB Air Traffic Controller (ATC) the last contact with the pilot was at 1351Z when the pilot reported "ops normal".
- 1.1.3 According to eyewitnesses, they saw the helicopter flying very low in a southerly direction towards FAWB and it made a turn back in the direction it came from. They heard a loud noise and helicopter then yawed to the left, descended at an angle of approximately 45 degree and crashed at the back yard of a house in the residential area. The helicopter was destroyed by fire and both occupants were fatally injured.

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 helicopter was destroyed.



Photo1: Shows the helicopter wreckage.

1.4 Other Damage

1.14.1 Other damage was caused to precast concrete fence and tree of the house.

1.5 Personnel Information

Pilot in Command

Nationality	South African	Gender	Male	Age	38
Licence Number	0271072829	Licence Type	Commercial pilot-helicopter		
Licence valid	Yes	Type Endorsed	Yes		
Ratings	Instructor rating Grade 2				
Medical Expiry Date	31 March 2011				
Restrictions	None				
Previous Accidents	Nil				

Flying Experience:

Total Hours	595.7
Total Past 90 Days	Unknown
Total on Type Past 90 Days	Unknown
Total on Type	287.7

Note: The above flying hours are obtained from the last entry on the pilot file. This was obtained from form (CA 61-06.4) "Initial skills test or competency check report for commercial pilot licence" on the 30 March 2010.

Pilot number 2 (owner of the helicopter)

Nationality	South African	Gender	Male	Age	40
Licence Number	0272310434	Licence Type	Private pilot-helicopter		
Licence valid	No	Type Endorsed	Yes		
Ratings	None				
Medical Expiry Date	30 September 2010				
Restrictions	None				
Previous Accidents	Nil				

Flying Experience:

Total Hours	124.8
Total Past 90 Days	9.6
Total on Type Past 90 Days	9.6
Total on Type	124.8

The owner of the helicopter could not exercise the privileges of his PPL (H) as his licence was not valid at the time of the flight. The owner was flying with the pilot with a valid licence in the preparation of his licence renewal which expired on the 30 September 2010.

1.6 Aircraft Information

Airframe:

Type	Robinson R22 Beta	
Serial Number	4212	
Manufacturer	Robinson Helicopter Company	
Date of Manufacture	2007	
Total Airframe Hours (At time of Accident)	541.8	
Last MPI (Date & Hours)	12/02/2010	489.6
Hours since Last MPI	52.2	
C of A (Issue Date)	11 December 2008	
C of R (Issue Date) (Present owner)	17 August 2010	
Operating Categories	Standard part 127	

Engine:

Type	Lycoming O-360-J2A
Serial Number	L-40901-36E
Hours since New	541.8
Hours since Overhaul	TBO NOT REACHED

- 1.6.1 The helicopter was refuelled with 35 litters of AVGAS/100LL on the 29 October 2010 at Lanseria International Airport (FALA). According to the information on the flight folio the helicopter was last flown on the 29 October prior to the day of the accident. There was no fuel uplift recorded on the flight folio. The quantity of fuel remaining could not be determined due ruptured tanks.

1.7 Meteorological Information

- 1.7.1 Official weather report obtained from the South African Weather Services reported the following weather conditions on the day of the accident: for the time 1500Z.

Wind direction	300°	Wind speed	03 knots	Visibility	10 km
Temperature	29°C	Cloud cover	Unknown	Cloud base	Unknown
Dew point	9°C				

1.8 Aids to Navigation

- 1.8.1 The helicopter was equipped with standard navigational equipment as per Equipment List approved by the Regulator. There were no recorded defects to navigational equipment prior to the flight.

1.9 Communications.

1.9.1 The helicopter was equipped with a VHF transmitter communication equipment as per equipment List approved by the Regulator. There were no recorded defects to communication equipment prior to the flight.

1.9.2 The pilot communicated with FAWB ATC on frequency 118.20 MHz. According to the air traffic control (ATC) the last communication between the pilot and the controller was at 1351Z, when the pilot reported normal operations.

1.10 Aerodrome Information

1.10.1 The location of the accident site was on private property of the back of a house in the residential area at Rooiwal, approximately 5nm north of FAWB. The GPS coordinates of S25°33.525' E 028°14.862'



Photo 2: Google view of the accident location.

1.11 Flight Recorders

1.11.1 The helicopter was not fitted with a Flight Data Recorder (FDR) or Cockpit Voice Recorder (CVR) nor was it required by the regulator.

1.12 Wreckage and Impact Information

1.12.1 According to the witnesses the helicopter was flying in a southerly direction towards FAWB at the height of approximately 50m above the houses and it made a turn back to the direction that it came from. The helicopter impacted a tree and went down in a 45° angle and impacted the ground. The helicopter then flipped on its left hand side. The helicopter was destroyed by ground impact damage and post impact

fire. The debris from the wreckage was found scattered around a 5 m radius. The main rotor was still intact and not burnt. The tail boom and tail rotor was broken due to the helicopter impacting the asbestos hall. The engine and gearbox was partially burnt.

The main wreckage was found approximately 24 metres from where the helicopter struck the tree.

1.13 Medical and Pathological Information

1.13.1 The post-mortem indicated that both occupants were fatally injured due multiple injuries. The blood toxicology report was not performed due to the blood presented to the laboratory being in the wrong containers.

1.14 Fire

1.14.1 A fire started after impact and consumed most of the cockpit and cabin area of the helicopter.

1.15 Survival Aspects

1.15.1 The accident was not considered survivable due to the impact sequence combined with the fire destruction of the helicopter.

1.15.2 After the accident the local residents assisted in extinguishing the fire using hosepipes, soil, buckets of water and a fire extinguisher that was recovered from the helicopter.

1.15.3 The helicopter was equipped with two fire extinguishers but due to the intensity of the fire the first responders at the accident were only able to access one fire extinguisher.

1.16 Tests and Research

1.16.1 During an on-scene investigation, no fuel sample was available for analysis as the cockpit/ cabin area was found destroyed by the post impact fire.

1.16.2 During an on-scene investigation, the area in the vicinity on the accident was examined to determine if there was any other evidence around, the investigators observed that there was a tree that was chopped by the helicopter. The tree was located a house next door to where the accident occurred. The indication was that the tree branches were chopped by the blades, it was not clear which blades impacted the tree. The first point of ground impact of the helicopter was approximately 24 meters from the impacted tree.

1.16.3 The engine

The wreckage was recovered to an Approved Maintenance Organisation (AMO) for further investigation. Due to the damage to the engine, it was not possible for the engine to be bench tested (ground run); the engine teardown investigation was

performed. The following summary of the findings was identified:

- The fan and scroll assembly were pushed against one another and showed no indication that the fan was turning, as there were no scuff marks on the inside of both the scroll and the fan.
- Small amount of dirt (sand) were found on some intake valves and exhaust valves.
- Cylinder No.2 had no compression during inspection stand.
- All intake and exhaust valves were moving freely.
- No abnormal exhaust guide wear or carbon build-ups were found.

1.17 Organizational and Management Information

1.17.1 The flight was considered to have been a private flight in the preparation of renewal of the owner PPL.

1.17.2 The owner of the helicopter was accompanied by pilot with a valid licence; the indication is that the purpose of the flight was to prepare the owner for revalidation check for his licence (private pilot licence helicopter) PPL (H).

1.17.2 According to available records, the Approved Maintenance Organisation (AMO) that certified the last MPI on the helicopter prior to the accident was in possession of a valid AMO approval.

1.18 Additional Information

1.18.1 Witness statements

1. The first witness stated that while he was at the gate of a residential property at approximately 1430Z to 1500Z he heard a noise, looked up and saw a helicopter which was approximately 50m high. The helicopter made a turn back in the direction that it came from. The witness stated that he heard a loud noise and the helicopter's nose yawed to the left and went down in a nose down attitude and crashed. As the helicopter was on fire after the impact the witness assisted to extinguish the fire with a hosepipe.
2. The second witness stated that he heard the noise, went outside and saw the helicopter on fire. He was the first person on site and tried to help the occupants but was unable because of the intensity of the fire.
3. The third witness, who is the owner of the house, mentioned that she heard a loud noise, looked out of the window and saw the fire blaze. She heard someone calling for help but not sure if it was the helicopter occupants or the neighbour. She ran outside and called for help whilst one neighbour was trying to help the occupants.
4. The fourth witness stated that he was with his friend when they heard the noise, looked up and saw the helicopter flying very low above the houses, as if the occupants were looking for something. He mentioned that the helicopter was flying from the north towards the south and then it turned back to the direction it came from. Heard some loud noise and the helicopter's nose then yawed to the left and went down in a 45° angle.

5. The fifth witness reported to the Wonderboom Airport management that she saw the helicopter on the day of the accident. The witness stated to the investigator during the telephone interview that she saw the helicopter in the Pyramid area which is about 6km from Rooiwal where the accident happened. She stated that the helicopter was flying very low like they were looking for a place to land. The helicopter then descended but did not touch the ground (hovering) in the open space. The witness then went to see if the occupants needed help but the helicopter went up again and flew towards Rooiwal before she could reach the helicopter. The helicopter was flying very low and then disappeared in the Rooiwal area.

1.18.2 According to the Civil Aviation Regulations (CARs), no aircraft is supposed to fly low over build up area. The following was extracted from the regulations:

*"91.06.32 (1) Except when necessary for taking off or landing, or except with prior written approval of the Commissioner, no aircraft –
(a) shall be flown over built-up areas or over an open-air assembly of persons at a height less than 1 000 feet above the highest obstacle, within a radius of 2 000 feet from the aircraft;*

(b) when flown elsewhere than specified in paragraph (a), shall be flown at a height not less than 500 feet above the ground or water, unless the flight can be made without hazard or nuisance to persons or property on the ground or water; and

(c) shall circle over or do repeated overflights over an open-air assembly of persons at a height less than 3 000 feet above the surface."

1.18.3 a) The helicopter was imported from the United State of America (USA) to South Africa in 2008. Deregistration of the helicopter from the USA civil aircraft register was effective from the 25 November 2008. The "Approval for classification of aircraft & allocation of registration letter" was signed on the 10 December 2008 by the South African Civil Aviation Authority (SACAA) and the certificate of registration was issued on the same date.

b) On the 29 November 2008 a new logbook was opened for the helicopter with registration ZS-RNN. On the 10 October 2008 a mandatory service bulletin (SB No. 582A) was issued by Lycoming for all the Lycoming engines equipped with any Marvel-Schebler, Facet, Precision, or Volare carburetor model. There was no record showing that Lycoming SB 582 and SB 582A and Precision SB MSA-13 were complied with.

c) There was no record that service bulletin SB-98 was complied with. The SB background is the "RHC received a report of a failed spring pin on the removable collective stick causing the co-pilot to loose throttle control. This spring pin attaches the toothed coupling at the aft end of the stick to the throttle grip's internal torque tube. Original 0.094-inch diameter spring pins must be replaced with strong 0.125-inch diameter spring pin".

d) Although there were no records in the logbooks to indicate that the above Mandatory Service Bulletins; Precision MSA-13, Lycoming SB 582 and SB582A; SB-98 were complied with, the investigator received information that indicates that the helicopter complied with the bulletins. The carburettor which was installed on

the helicopter prior to the accident was originally fitted with the new type blue solid epoxy float from new.

1.19 Useful or Effective Investigation Techniques

1.19.1 None

2. ANALYSIS

2.1 Man

2.1.1 The helicopter was flown from FAWB to the GFA with the intention to land back at FAWB when the accident occurred. The PIC was a holder of a valid pilot licence and was correctly rated on the flight. There was no evidence that medical problems might have affected the pilot performance. The pilot was flying the helicopter low in the build-up area for an unknown reason.

2.2 Machine

2.2.1 After the accident, the engine was recovered to the AMO for further investigations. Due to the damage to the engine, it was not possible for the engine to be ground run, the engine teardown investigations was performed. The report indicated that there was no evidence showing that the fan was turning during the impact sequence. This was an indication that the engine was not operation prior to it impacted the ground.

2.2.2 The report further indicated that No.2 cylinder had no compression during the engine teardown investigation, and all intake and exhaust valves were moving freely. The likelihood that the sticky valve could have caused the engine not to operate was eliminated by the investigator. This could have been caused by the engine fire during the accident sequence.

2.2.3 The investigation could not establish if the engine had any mechanical problem that could have contributed to the engine to be inoperative prior to ground impact, due to the extensive damage on the engine which made it impossible for the engine to be fitted on the test bench.

2.2.4 There was no record of any malfunction or defect recorded that could have contributed to the cause of the accident. The helicopter had flown 541.8 hours since new and 52.2 hours since the last MPI.

2.2.4 The helicopter refuelled with 35 liters of fuel on the 29 October 2010. According to the information on the flight folio the helicopter was last flown on the 29 October prior to the day of the accident. There was no fuel uplift recorded on the flight folio. The helicopter fuel tanks were ruptured and the helicopter burned, there was no evidence of the available fuel during the onsite investigations.

2.3 Environment

- 2.3.1 The indication is that the helicopter was flown low in the build-up area prior to the accident. The helicopter impacted a tree before it crashed at the back of the house in the residential area.
- 2.3.2 The terrain below the helicopter was not suitable in the event of an engine failure because it was predominantly constrained by obstacles.
- 2.3.3 The prevailing weather conditions at the time of the accident were considered not to have been a factor in this accident, the helicopter was flying under visual flight rules (VFR) conditions at the time of the incident.

3. CONCLUSION

3.1 Findings

- 3.1.1 The pilot in command was holder of a valid Commercial helicopter pilot's license with an instructors Grade II rating and correctly type rated.
- 3.1.2 The pilot had a valid medical certificate at the time of the accident.
- 3.1.3 The helicopter had a valid Certificate of Airworthiness and Certificate of Registration at the time of the accident.
- 3.1.4 Location of the crash-site is at a built-up area in the back yard of a house.
- 3.1.5 The helicopter impacted a tree while flying low in the build-up-area.
- 3.1.6 The accident was not survivable and both occupants were fatally injured.
- 3.1.7 The helicopter was destroyed by fire.
- 3.1.8 The engine was not operating at the time of the accident.
- 3.1.9 The weather was not considered a factor in this accident.
- 3.1.10 The toxicology report was not available due to wrong container that was used to collect blood samples.
- 3.1.11 SB's were not complied with (refer to the appendix, page 16)

3.2 Probable Cause/s

- 3.2.1 The helicopter impacted a tree during low level flying over build-up area and crashed into a yard.

3.3 Contributory factor

- 3.3.1 Inoperative engine during low level flying.

4. SAFETY RECOMMENDATIONS

4.1.1 None.

5. APPENDICES

5.1.1 Annexure A (Engine teardown report)

Compiled by: M Moeletsi

.....
For: Director of Civil Aviation

Date:

Investigator-in-charge :

Date:

Co-Investigator :

Date:

CP



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16 November 2010

The South African Civil Aviation Authority
MIDRAND

Sirs

RE: Engine Power Plant Investigation Robinson ZS-RNN

This company was requested by yourselves to inspect the power plant of the above mentioned helicopter with Rotorcraft Serial No. 4212.

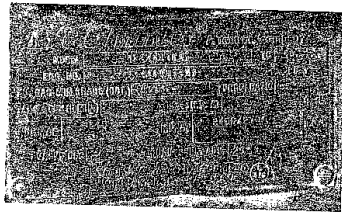


Figure 1: Identification Plate indicating the Engine Model: O-360-J2A and Engine Serial Number: L-40901-36E

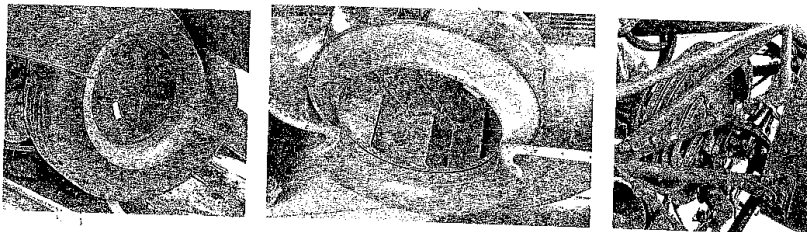


Figure 2: Indicating the observations before engine removal as discussed below

Before the engine was removed, the following was observed:

1. The fan and scroll assembly were pushed against one another and showed no indication that the fan was turning, as there were no scuff marks on the inside of both the scroll and the fan.
2. The Drive V-belts were no longer in their original position on the clutch assembly.
3. Front belt broken and rear belt twisted.

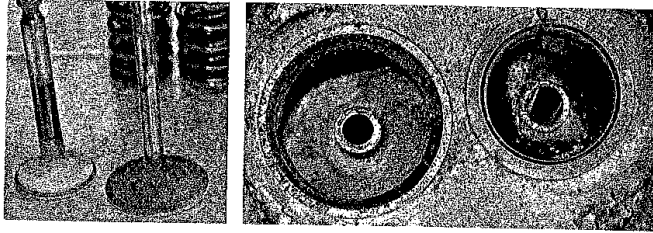


Figure 3: Indicating the engine compartment, after engine removal

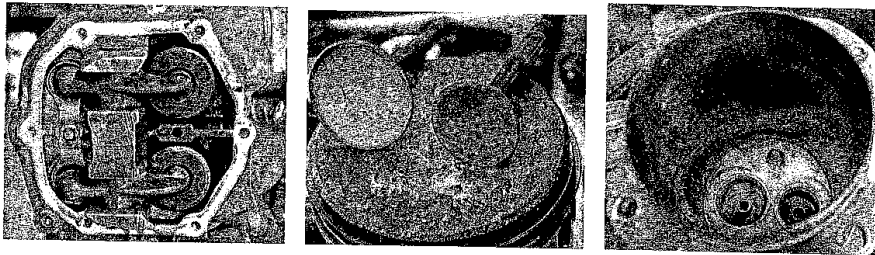
Engine top mounting bolts were extremely bent and the engine compartment was severely burnt.

OBSERVATION OF THE ENGINE POWER PLANT DURING DISASSEMBLY:

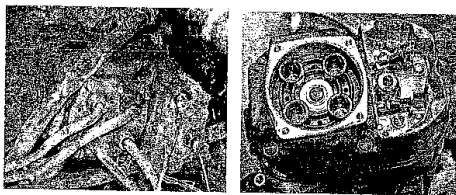
1. A general observation of the engine internally revealed it to be uncontaminated with no debris.
2. Spin-on oil filter and sump finger filter inspected and found to be uncontaminated with no metal particles.
3. All engine components have been inspected and found to be intact and not damaged.
4. Small amounts of dirt (sand) were found on some intake valves and exhaust valves.
5. All bottom spark plugs were fouled.



6. Cylinder bores visually inspected and no wear was found within the top two inches of the barrel.
7. Honing patterns were visible and no evidence of glazing.
8. Cylinder bores were dimensionally inspected and all cylinders were within serviceable limits.
9. Cylinder No. 2 had no compression during inspection on engine stand.
10. All intake and exhaust valves were moving freely.
11. No abnormal exhaust guide wear or carbon buildups were found.
12. No bent push rods were observed.



OBSERVATION OF COMPONENTS:



A : Left Magneto:

Note: According to engine logbook the following Mandatory Service Bulletins were not complied with: Precision MSA-13, Lycoming SB 582 and SB582A.

ENGINE LOGBOOK CA21-27E OBSERVATION:

The following Mandatory Service Bulletins were not found in the engine logbook:

1. Precision MSA13; Carburetor float change.
2. Lycoming MSB 582 and 582A; Carburetor float change.

AIRFRAME LOGBOOK CA21-27A OBSERVATION:

The following Bulletin was not found in the airframe logbook:

1. Robinson RHC SB98, removable collective spring pin
2. On page 77, Ignition Systems SB 643 was carried out, and not SB643B the latest service bulletin.



Engine Shop Representative
G Dippenaar