

AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference: CA18/2/3/8686	
Aircraft Registration	ZU-RIT	Date of Accident	30 August 2009		Time of Accident 0728Z
Type of Aircraft	Sanka AK 1-3		Type of Operation		Private
Pilot-in-command Licence Type		Commercial	Age	49	Licence Valid Yes
Pilot-in-command Flying Experience		Total Flying Hours	1 017		Hours on Type 178.9
Last point of departure		Klaserie, Limpopo Province			
Next point of intended landing		Rhenosterkop, Nelspruit, Mpumalanga Province			
Location of the accident site with reference to easily defined geographical points (GPS readings if possible)					
Heidelberg Valley, 5 km from White River. GPS coordinates: S25°21.277' E030°57,972')					
Meteorological Information		Surface wind: 270°/4 kts; Temperature: 23°C; Visibility: CAVOK			
Number of people on board	1 + 2	No. of people injured	0	No. of people killed	1 + 2
Synopsis					
<p>On 30 August 2009, the pilot and two passengers were on a private flight from Klaserie in Limpopo to Rhenosterkop near Nelspruit. At 0711Z, the pilot established radio contact with Kruger Mpumalanga International tower on frequency 119.2 MHz, stating that he was inbound from Klaserie, and requesting routing to Rhenosterkop.</p> <p>At 0726Z, Kruger Mpumalanga tried to establish radio contact with the pilot but received no response. At approximately 0728Z, it was reported that the helicopter had crashed and caught fire in the Heidelberg valley near White River. All the occupants were fatally injured</p> <p>The scope of this investigation was severely limited by the fact that the helicopter had been largely destroyed by fire, and the engine, fuel components and governor system could not be tested.</p>					
Probable Cause					
An unsuccessful forced landing following a probable engine governor malfunction.					
IARC Date				Release Date	

**AIRCRAFT ACCIDENT REPORT**

Name of Owner/Operator : Snycor CC
Manufacturer : Aerocopter Ltd
Model : Sanka AK 1-3
Nationality : South African
Registration Marks : ZU-RIT
Place : White River
Date : 30 August 2009
Time : 0745Z

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 30 August 2009, the pilot and two passengers were on a private flight from Klaserie in Limpopo to Rhenosterkop near Nelspruit. At 0711Z, the pilot established radio contact with Kruger Mpumalanga International tower on frequency 119.2 MHz, stating that he was inbound from Klaserie, and requesting routing to Rhenosterkop.
- 1.1.2 At 0726Z, Kruger Mpumalanga tried to establish radio contact with the pilot but received no response. At approximately 0728Z, it was reported that the helicopter had crashed and caught fire in the Heidelberg valley near White River.
- 1.1.3 A witness walking in the area said that he had heard the helicopter approaching from the north. When he saw the helicopter, he heard that the engine RPM was surging. He then saw the main rotor begin to slow, and the aircraft lost height rapidly. It struck the ground at a very high descent rate.
- 1.1.4 The accident occurred in daylight at approximately 0728Z in an open grassy area near a bluegum plantation in the Heidelberg valley, at GPS coordinates S25°21.277' E030°57,972") and an elevation of approximately 2 604 ft above mean sea level (AMSL).

1.2 Injuries to Persons

Injuries	Pilot	Crew	Pass.	Other
Fatal	1	-	2	-
Serious	-	-	-	-
Minor	-	-	-	-
None	-	-	-	-

1.3 Damage to Aircraft

1.3.1 The helicopter was completely destroyed on impact and by the post-impact fire.



Figure 1. The wreckage of the helicopter.

1.4 Other Damage

1.4.1 The vegetation in the immediate vicinity was consumed by the post-impact fire.

1.5 Personnel Information

Nationality	South African	Gender	Male	Age	49
Licence Number	*****	Licence Type		Commercial	
Licence valid	Yes	Type Endorsed		Yes	
Ratings	Test Pilot Rating				
Medical Expiry Date	31 July 2010				
Restrictions	Corrective lenses				
Previous Accidents	None				

Flying Experience

Total Hours	1 017.0
Total Past 90 Days	36.9
Total on Type Past 90 Days	29.9
Total on Type	178.9

- 1.5.1 These hours were extrapolated from the pilot's log book which had last been updated on 17 August 2009.

1.6 Aircraft Information

Airframe

Type	Sanka AK 1-3	
Serial Number	0009	
Manufacturer	Aerocopter LTD	
Year of Manufacture	2007	
Total Airframe Hours (at time of accident)	Unknown	
Last Annual Inspection (Date & Hours)	17 November 2009	111.9
Hours since Last Annual Inspection	Unknown	
Authority to fly (Issue Date)	9 January 2009	
C of R (Issue Date) (Present Owner)	21 December 2007	
Operating Categories	Standard	

NOTE: The Sanka AK 1-3 Helicopter is a two-seat helicopter.

Engine

Type	Subaru EJ 2.5
Serial Number	111656115935
Hours since New	Unknown
Hours since Overhaul	TBO not yet reached

- 1.6.1 Records for the total airframe and engine hours were not available, as the flight folio was destroyed in the fire.

- 1.6.2 Weight and Balance calculations

	Weight (kg)	Arm (m)	Moment (kg.m)
A/C empty weight	413.5	2.642	1092.467
Pilot	70	1.947	136.29
Fwd passengers x 2	55.2	1.947	107.4744
Fuel main tank	20	2.545	50.9
TOTAL T/O Weight	558.7	2.4828	1387.1314

$$\begin{aligned}\text{C of G} &= \text{Datum line} - \text{Arm} \\ &= 2.5 - 2.4828 \\ &= 0.0172 \text{ m}\end{aligned}$$

- (i) The helicopter was operated within the centre of gravity (C.G) envelope. According to the flight manual the Forward CG limit is (+0.08m) and the Aft CG limit is(-0.045)
- (ii) The helicopter's take off mass was below the maximum take-off mass of 650kg.
- (iii) The amount of fuel on board is estimated from the distance travelled and the endurance of the helicopter with a full tank.

1.7 Meteorological Information

- 1.7.1 The following information was obtained from the official weather report of the South African Weather Services:

Wind direction	270°	Wind speed	4 kts	Visibility	CAVOK
Temperature	23°C	Cloud cover	Scattered	Cloud base	20 000 ft
Dew point	7°C				

- 1.7.2 The meteorological conditions at the time were suitable for visual flight, and the weather did not contribute to the accident.

1.8 Aids to Navigation

- 1.8.1 The aircraft was equipped with standard navigational equipment, all of which had been serviceable prior to the accident.

1.9 Communications

- 1.9.1 The pilot established radio contact with Kruger Mpumalanga International tower on frequency 119.2 MHz as he was entering their CTR. The pilot made no calls indicating that he was experiencing any sort of problem.

1.10 Aerodrome Information

- 1.10.1 The helicopter crashed onto an open grassy area in the Heidelberg valley, approximately 2.54 nautical miles south-west of White River, at GPS coordinates S25°21.277' E030°57.972' and at an elevation of approximately 2 604 ft AMSL.

1.11 Flight Recorders

- 1.11.1 The helicopter was not fitted with a flight data recorder or a cockpit voice recorder. Neither of these was required by regulations.

1.11 Wreckage and Impact Information

- 1.11.1 The accident site was a level grassy area near a bluegum plantation. Ground scarring and debris at the initial impact point indicated that the helicopter had descended more or less vertically, at low forward airspeed, and in a straight and

level attitude. The helicopter was on a south-easterly heading on impact. The nature of the accident site and the ground scarring suggest that the pilot might have been attempting a forced landing.

- 1.11.2 The helicopter was completely destroyed by the impact forces and the fire that erupted. There was no evidence of structural in-flight failure, as all control surfaces were accounted for on site.



Figure 2. The wreckage distribution.

1.13 Medical and Pathological Information

- 1.13.1 Post mortem results revealed that the pilot had died of injuries associated with the crash.
- 1.13.2 The results of toxicology tests were not available at the time that this report was compiled. If any results are received later indicating that medical aspects may have affected the performance of the pilot, this will be considered as new evidence and the investigation will be re-opened.

1.14 Fire

- 1.14.1 A post-impact fire erupted during the impact sequence and destroyed what remained of the aircraft.

1.15 Survival Aspects

- 1.15.1 The accident was considered non-survivable due to the high impact forces and post-impact fire.

1.16 Tests and Research

1.16.1 On-site Wreckage Examination:

- (i) On-site inspection of the wreckage revealed that all structural damage was consistent with the impact forces and post-impact fire. Nothing was found to suggest that there had been any pre-impact failure of the primary structure. Because of the extent of damage to the wreckage caused by the post-impact fire, only the engine was taken to an approved overhaul facility for a teardown for further analysis.

1.16.2 Engine Examination:

- (i) The Subaru engine, model EJ 2.5, was recovered and taken to a Subaru-approved service centre in Nelspruit where a complete engine teardown was conducted by a Subaru technician under the supervision of CAA representatives.
- (ii) The engine was stripped down and all its parts properly examined. The findings suggested that, mechanically, the engine had been in good working order. Nothing could be found to indicate that the engine might have had a problem prior to the accident.

1.17 Organisational and Management Information

1.17.1 The helicopter was privately owned and operated by the pilot.

1.17 Additional Information

1.17.1 Background:

The investigation revealed that the helicopter had been fitted with a cruise control governor. When the investigator contacted the South African agent of the manufacturer (Aerokopter Ltd) to learn more about the operation of this governor, it was discovered that there has been a problem in the past with the system fitted to these helicopters.

On 30 October 2008, another Sanka AK1-3 helicopter, ZU-ETU, had crashed at Sabi Sands under precisely the same circumstances as ZU-RIT, although the pilot had survived. Subsequent to the findings of that investigation, the manufacturer had issued a decision letter on 20 January 2009 prohibiting the use of the governor system on this helicopter type and calling for its removal.

According to the manufacturer's agent, the letter had been forwarded to all operators of the Sanka AK 1-3 in South Africa. Despite this, the governor system had not been removed from the accident aircraft.

1.17.2 The evidence presented by the pilot of ZU-ETU was similar to that of the eye-witness to the ZU-RIT accident. The manufacturer's agent provided the following brief description of how the governor's malfunction affects the engine operation:

- (i) The governor system has its own separate throttle cable commanding the throttle butterfly. If the governor system commands the throttle butterfly valve to open wide suddenly, the engine and main rotor speed will suddenly increase (a surge). In such a scenario, the pilot will be unable to manually close the throttle to bring the speed under control. The only way to control such overspeed would be to load the rotors by increasing collective pitch.
- (ii) However, if the system commands the throttle butterfly to close, thereby reducing engine and rotor rpm, the pilot can override the governor manually. In summary, the cruise control governor system allows the pilot to manually override its command inputs in one direction only. He can increase power but not decrease it.
- (iii) The Aerokopter agent's observation was that if the electronic governor control malfunctioned and commanded the throttle valve to open wide – thus producing engine and rotor overspeed – a pilot's normal reaction would be to twist the throttle closed in an attempt to reduce engine speed. With the throttle twist grip closed, the governor would command the throttle butterfly valve to close immediately, with the consequent sudden loss of both engine and rotor rpm.

1.19 Useful or Effective Investigation Techniques

1.19.1 None.

2. ANALYSIS

- 2.1 On 30 August 2009, the pilot and two passengers were on a private flight from Klaserie in Limpopo to Rhenosterkop in Nelspruit. At 0711Z, the pilot established radio contact with Kruger Mpumalanga tower on frequency 119.2 MHz, stating that he was inbound from Klaserie, and requesting routing to Rhenosterkop. At 0726Z, Kruger Mpumalanga tried to establish radio contact with the pilot but failed to obtain a response. At approximately 0728Z, it was reported that the helicopter had crashed and caught fire in the Heidelberg valley near White River.
- 2.2 Meteorological conditions were suitable for visual flight, and the weather did not contribute to the accident.
- 2.3 The sequence of events, together with the wreckage distribution, suggests that the helicopter struck the ground at a level attitude but at a very high descent rate. The nature of the accident site and the ground scarring indicated that the pilot might have been attempting a forced landing, following an engine problem seen by the eye-witness a short distance away.
- 2.4 Examination of the engine did not reveal any internal mechanical cause of failure, and similarly, examination of the remaining engine accessories revealed no overt causal indications. However, further investigation revealed that the helicopter had been fitted with a cruise control governor, which, following another accident under similar circumstances, had been prohibited from being used on this helicopter type by the manufacturer.

- 2.5 The scope of this investigation was severely limited by the fact that the helicopter had been largely destroyed by fire. In particular, the governor system could not be tested. However, due to the similarity between this accident and the one involving ZU-ETU, the possibility exists that a failure of the governor might have caused the engine to fail and the helicopter to lose rotor rpm, which led to an unsuccessful forced landing.

3. CONCLUSION

3.1 Findings

- 3.1.1 The pilot was a holder of a valid private pilot's licence (helicopter).
- 3.1.2 The aircraft had a valid Authority to Fly certificate.
- 3.1.3 Weather conditions were reported to be fine, with the prevailing wind being 250° at 6 kts. They were not a factor in the accident.
- 3.1.4 The accident occurred in daylight conditions.
- 3.1.5 The helicopter was equipped with two seats, but there were three occupants on board. The two passengers (two kids of 11 and 8 years respectively) were strapped to one seat.
- 3.1.6 The helicopter was operated within its weight and balance limitations.
- 3.1.7 The helicopter was fitted with a cruise control governor which was prohibited from being used on this helicopter type by the manufacturer.
- 3.1.8 The helicopter crashed following an unsuccessful forced landing following a probable engine governor malfunction.

3.2 Probable Cause/s

- 3.2.1 An unsuccessful forced landing following a probable engine governor malfunction.

4. SAFETY RECOMMENDATIONS

- 4.1 See Appendix 1 (MEMO to the CCA)

5. APPENDICES

- 5.1 Appendix 1 (MEMO to the CCA)

Report reviewed and amended by the Advisory Safety Panel on 20 July 2010

-END-

APPENDIX 1

SOUTH AFRICAN



**CIVIL AVIATION
AUTHORITY**

MEMO

To: Capt. C Jordaan (CCA)
CC: Albert Morudi (SM: AIID) and Rennie van Zyl (EM: AIID)
From: M.I Maseko – (IIC: ZU-RIT)
Re: Safety Recommendation
Fatal Accident: Sanka AK 1-3
Date: 21/10/2009

Purpose of the Memo

To recommend that the commissioner issue an Airworthiness Directive (AD) following the Sanka AK 1-3 helicopter accident.

Introduction and Background

On the 30 August 2009, the pilot accompanied by two passengers was on a private flight from Klaserie (Limpopo) to Rhenosterkop in Nelspruit. At 0711Z, the pilot established radio contact with Kruger Mpumalanga International Airport (FAKN) control tower, stating that he was inbound from Klaserie, requesting routing to Rhenosterkop.

At 0726Z, the FAKN control tower tried to establish radio contact with (ZU-RIT) but there was no response. At approximately 0728Z, it was reported that the helicopter had crashed and caught fire in the Heidelberg valley outside White River.

The helicopter was completely destroyed in the accident, and all three occupants were fatally injured.

Discussion

Investigation revealed that the accident aircraft was fitted with a Cruise Control Governor. When the investigator contacted the Manufacturer's (Aerokopter LTD) agent in South Africa with regards to the operation of the governor on this helicopter, it was discovered that there has been a problem in the past with the operation of the governor system.

A reference was made to an accident involving another Sanka AK1-3 helicopter, registration ZU-ETU which occurred at Sabi Sands on 30 October 2008. The circumstances around that accident were exactly the same as this one.

Subsequent to the findings and conclusions to the investigation of (ZU-ETU), the Manufacturer issued a letter on 20 January 2009 (attached to this memo) prohibiting the use and also calling for the removal of the Governor system on this helicopter type. According to the Manufacturer's agent the letter was forwarded to all the operators of the Sanka AK 1-3 in South Africa, however the governor system had not been removed from the accident aircraft at the time of the accident.

Recommendations


It is recommended that the Commissioner for Civil Aviation issue an Airworthiness Directive to all the Sanka AK 1-3 Type Helicopter owners and/or operators, prohibiting the use and also calling for the removal of the Governor system on this helicopter type as stipulated in the letter from the Manufacturer.


M.I. MASEKO
All Department

21 October 2009
Date

~~Recommended/Not Recommended~~

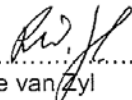
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AP Morudi
SM: AIID

23/10/09
Date

~~Approved/ Not Approved~~

Safety Recommendation supported
.....
.....
.....


Rennie van Zyl
EM: AIID

23/10/09
Date

~~Accepted/ Not Accepted~~

AS Division to issue AD immediately
.....
.....
.....


Capt. C Jordaan
CCA

2009-10-23
Date

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APPENDIX A

CONFIRM

Igor Polituchy

The director of DB Aerocopter, Ltd

January 20, 2009

THE DECISION No. VRTK 08-4

about the prohibition of using the governor system

Under the conducted additional work on an exception of the capability of malfunction of the governor system based on 87022AE02A controller/87012AE10A actuator which determined during flight operation, it is accepted the following

DECISION:

1. To prohibit the further operating of AK1-3 helicopter with using the governor system based on 87022AE02A controller/87012AE10A actuator.
2. To dismantle both the 87022AE02A controller and the 87012AE10A actuator by helicopters SN0008, 0009, 0010, 0011, 0012, 0031 and 1001.
3. To eliminate any information from the helicopter's operation and maintenance documentation concerning using of the governor system based on 87022AE02A controller/87012AE10A actuator.
4. To bring this decision to the owners of the helicopters AK1-3 SN0008, 0009, 0010, 0011, 0012, 0031 and 1001.

January 20, 2009

Vyacheslav.ShCherbak, the chief designer