SOUTH AFRICAN



Section/division Occurrence Investigation

AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

					Reference	: CA18/2/3/8484	
Aircraft Registration	ZU-DIM		Date of Accident	23 /	April 2008	Time of Acciden	t 0930Z
Type of Aircraft	BUSHB	ABY	450 (Aeroplane)	Туре с	of Operatio	n Private	ŧ
Pilot-in-command Lice	ence Type		Private Pilot	Age	37	Licence Valid	Yes
Pilot-in-command Flyi	ing Experie	ence	Total Flying Hours		64.8	Hours on Type	6.9
Last point of departure New Tempe Aerodron			w Tempe Aerodrome	ne (FATP) (Free State)			
Next point of intended landing New Tempe A			w Tempe Aerodrome	FATP) (I	Free State)		
Location of the accident site with reference to easily defined geographical points (GPS readings if poss				possible)			
On a ploughed maize field at the geographical position S29°01.674' E027°.07.965'							
Meteorological Information Visibility: CAVOK, Temperature: 19°C, Wind: 100° 0-5kts, No Clouds							
Number of people on	board	1+0	No. of people injured		0 1	No. of people killed	0
Synopsis							

On 23 April 2008 at 0645Z the pilot took off from the New Tempe Aerodrome to fly one circuit at the aerodrome. After he had completed the circuit and landed, he took off on a flight to the Krugersdrift Dam. On his return flight, as he entered the New Tempe Aerodrome airspace, the aircraft engine suddenly lost power with an RPM drop of 1000 RPM. The pilot then applied more engine power, which resulted in a vigorous vibration. Shortly thereafter he experienced a complete engine failure. He attempted to restart the engine twice, but without any success.

The pilot executed a forced landing in a ploughed maize field but as a result of the soft ground, the aircraft turned sharply to the left, resulting in the right-hand wing making contact with the ground, causing the aircraft to nose over.

The pilot did not sustain any injuries and the aircraft was substantially damaged during the accident sequence. No other damage was caused.

A strip-down inspection of the engine after the accident revealed that a main bearing on the crankshaft had disintegrated, sending all metal particles into all the cavities of the cylinder head, followed by the rotary valve seizure and the destruction of the brass gear and finally, engine failure.

Probable Cause

Engine failure during flight due to main bearing failure, followed by an unsuccessful landing due to unsuitable terrain.

IARC Date	Release Date	

Occurrence Investigation 011-545-1000



AIRCRAFT ACCIDENT REPORT

Name of Owner/Operator	: Schreuder H.A.L.
Manufacturer	: Kitplanes for Africa
Model	: Bushbaby 450
Nationality	: South African
Registration Marks	: ZU-DIM
Place	:Ploughed maize field 2 nm North West of New Tempe Aerodrome (FATP)
Date	: 23 April 2008
Time	: 0730Z

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 According to the pilot, on Wednesday 23 April 2008 at approximately 0645Z he took off from New Tempe Aerodrome (FATP). He did one uneventful circuit and landed back on Runway 10 for a touch and go.
- 1.1.2 After the touch and go he climbed to 5500ft before turning onto a heading of 320 degrees Magnetic towards Krugersdrift Dam. Before leaving the circuit area he communicated with circuit traffic on frequency 131.3 MHz. After leaving the circuit the pilot changed the radio frequency and broadcasted his intentions on frequency 124.8 MHz.
- 1.1.3 The pilot stated that he decided to turn back to FATP before reaching the Krugersdrift Dam. On entering the FATP airspace, he broadcasted his return on frequency 131.3 MHz. He already had FATP visual when the engine suddenly lost power and the RPM dropped by 1000 rpm. The pilot immediately applied more power, but the engine failed to respond. At this stage the pilot felt a damped vibration.
- 1.1.4 The pilot stated that he increased and decreased power but the engine started vibrating vigorously. At this stage he checked all temperatures, fuel master and magnetos, but all were fine. When the RPM started to decay even more, he closed the throttle and the engine immediately stopped.

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- 1.1.5 After the engine stopped, the pilot stated that he initiated a glide at 70 miles per hour (mph) while attempting to restart the engine. The engine was turning very slowly and it seemed there was no ignition. He attempted a second restart but the engine failed to restart.
- 1.1.6 The pilot stated that the propeller was not wind milling freely before he attempted the second restart.
- 1.1.7 When the pilot realized he would not reach FATP; he started looking for a suitable landing area. At 5000ft he made a may-day call on frequency 131.3 MHz while approaching the selected area for the emergency landing. Nearing the area he saw a fence with rather thick tar poles in front of him. Due to a power line to his right and a fence to his left, there was no other option, but to land straight ahead.
- 1.1.8 The pilot stated that he applied some flaps but found the aircraft sinking too fast and he then retracted the flaps immediately. As he was too low to clear the fence, he pulled the aircraft up in front of the fence and ballooned the aircraft over the fence.
- 1.1.9 The pilot stated he kept the aircraft in the flared position and landed at approximately 40 mph. The nose wheel still took its own course in the thick sand and even with full right rudder he could not prevent the right wing from digging into the soft soil and the aircraft nosed over.

1.2 Injuries to Persons

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

1.3 Damage to Aircraft

1.3.1 The aircraft was substantially damaged during the accidence sequence.

1.4 Other Damage

No other damage was observed.

1.5 **Personnel Information**

Nationality	South African	African Gender Male		ale	Age	37
Licence Type	Private Pilot					
Licence valid	Yes	Type Endorsed Yes				
Ratings	None					
Medical Expiry Date	31 July 2008					
Restrictions	None					
Previous Accidents	None					

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Flying Experience:

Total Hours	64.8
Total Past 90 Days	6.9
Total on Type Past 90 Days	18.3
Total on Type	3.4

1.6 Aircraft Information

Airframe:

Туре	Bushbaby 450 (Non type certified)		
Serial Number	52		
Manufacturer	Kitplanes For Africa		
Date of Manufacture	1997		
Total Airframe Hours (At time of Accident)	196.8		
Last Annual Inspection (Date & Hours)	4 March 2008 193.4		
Hours since Last Annual Inspection	3.4		
Authority to Fly (Issue Date)	6 March 2008		
C of R (Issue Date) (Present owner)	5 February 2008		
Operating Categories	Private		

Engine:

Туре	Rotax 582/99 DCDI-U2
Serial Number	5742304
Hours since New	196.8
Hours since Overhaul	N/A

Propeller:

Туре	P Prop
Serial Number	2268-FEC-2G4
Hours since New	196.8
Hours since Overhaul	N/A

No documentation could be found as to why a new propeller was fitted to the aircraft. As no proper documentation was available as to the reason for the propeller change by the previous owner, the investigator is of the opinion that the aircraft might have been involved in a propeller strike, which could have resulted in undetected damage to the engine.

1.7 Meteorological Information

1.7.1 The Meteorological information was obtained from the Pilot questionnaire.

	Wind direction	100° M	Wind speed	0-5 Knots	Visibility	CAVOK
	Temperature	19°	Cloud cover	None	Cloud base	-
Dew point -		-				
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1.7.2 The accident occurred during daylight and in good weather conditions, thus, the weather did not contribute to the accident.

1.8 Aids to Navigation

- 1.8.1 The only aid to navigation fitted to this aircraft was a Magnetic Compass.
- 1.8.2 The Pilot had a handheld Global Positioning System (GPS) in the aircraft. This GPS was not part of the standard aircraft equipment.

1.9 Communications

- 1.9.1 The aircraft was equipped with one Very High Frequency (VHF) (IC-A-200) radio.
- 1.9.2 Communications between the pilot and other aircraft within the circuit was normal on frequency 131.3 MHz at the time of the accident.

1.10 Aerodrome information

1.10.1 As the accident did not take place during take-off or landing at an aerodrome, no aerodrome information is relevant to this accident.

1.11 Flight Recorders

1.11.1 The aircraft was not equipped with a Flight Data Recorder (FDR) or Cockpit Voice Recorder (CVR) nor was it required by regulation.

1.12 Wreckage and Impact Information

1.12.1 The accident aeroplane was located in a ploughed maize field about 2 nautical miles North-East from New Tempe Aerodrome. The aircraft landed in a ploughed maize field and as a result of the soft ground, the nose wheel turned sharply to the left, resulting in the right wing tip making contact with the ground. This contact resulted in the aircraft nosing over and coming to rest in an inverted position. (See Photo 1)



Wing made contact with the ground surface

Photo 1.

- 1.12.2 Ground marks indicated that after the first contact with the ground, the aircraft bounced and only made contact with the ground 12 metres after the initial contact point. The aircraft then rolled for 45 metres before it nosed over.
- 1.12.3 No evidence was found of any pre-impact defects on the aircraft that might have affected the flight. All of the aircraft's components and flight control surfaces were accounted for at the accident site, and continuity of the flight and engine controls was established. The flaps were found in the retracted (zero degree) position.
- 1.12.4 Fuel leaking out of the fuel tanks, was evident on the scene.
- 1.12.5 Damage was caused to the wings, V-struts, nose wheel assembly and propeller spinner.

1.13 Medical and Pathological Information

1.13.1 The pilot did not sustain any injuries as a result of the incident.

1.14 Fire

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

1.14 Survival Aspects

- 1.14.1 The accident was considered as survivable due to the fact that there were no abnormal impact forces on the fuselage of the aircraft. A contributing factor to the survivability of this accident was the low speed during landing and the pilot was properly secured by the safety harness during the accident.
- 1.14.2 The pilot was able to communicate with other aircraft in the area after the accident. The pilots in these aircraft informed the New Tempe Aerodrome Tower, which in turn informed the police who were on the scene within 15 minutes.

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1.15 Tests and Research

- 1.15.1 The airframe and all flight control systems were inspected and apart from damage to the airframe, there was no damage to the flight controls.
- 1.15.2 The engine and all engine controls were inspected and apart from damage to the airframe and marks on the propeller and spinner, there was no visible damage to the engine and engine controls.
- 1.15.3 The engine was not able to turn freely after the accident, due to unknown reasons at the time.

1.16 Organisational and Management Information

- 1.16.1 This was a private flight and the owner-pilot operated the aircraft privately.
- 1.16.2 The last Annual Inspection of this aircraft was certified on 4 March 2008 on 184.6 hours by an Aero Club of South Africa (MISASA) registered, Approved Person (AP) No. 165.
- 1.16.3 The maintenance documentation revealed that a propeller change was done without completing any proper documentation in this regard. (See Appendix A.) The reason for this propeller change was not known to the owner, as he was not the owner at the time.

1.17 Additional Information

1.17.1 When the engine was removed from the aircraft for further investigation, an unknown piece of metal was found at the intake of No. 1 cylinder. (See Photo 2)



Photo 2 Unidentified piece of metal in the intake of No.1 cylinder

- 1.17.2 When the engine was disassembled after the accident, it was found that a main bearing on the crankshaft had disintegrated and metal particles had entered the cavities of the cylinder head and the rotary valve shaft assembly, which then caused the rotary valve seizure. The destruction of the brass gear finally caused the engine failure. (See Appendix B for complete report)
- 1.17.3 The aircraft was certified, equipped and maintained in accordance with existing regulations and approved procedures. The aircraft showed no evidence of structural or systemic failure.
- 1.17.4 The airframe and flight controls were found to have had no defect prior to the accident and all damage observed was as a result of the accident sequence.

1.18 Useful or Effective Investigation Techniques

1.18.1 None.

2. ANALYSIS

- 2.1 The pilot was in possession of a valid Private Pilot's licence, the Bushbaby 450 was endorsed onto his licence and the pilot had a valid medical certificate at the time of the accident.
- 2.2 Maintenance documentation indicates that the last Annual inspection was conducted on 4 March 2008. No proper documentation was available on the propeller change that was performed by the previous owner. An Authority to Fly was issued on 6 March 2008.
- 2.3 Before the accident, the pilot did a touch and go at the New Tempe Aerodrome without any abnormalities, before departing to the Krugersdrift Dam.
- 2.4 During the return flight, after entering the airspace at New Tempe Aerodrome, the engine lost power and RPM dropped by 1000 RPM. The pilot experienced a damped vibration, and an increase in power by the pilot resulted in an increase in the vibration level.
- 2.5 As the RPM started to decay more, the pilot closed the throttle, and the engine stopped immediately. The pilot attempted two restarts, but with no success.
- 2.6 A forced landing was executed and the aircraft nosed over in an inverted position.
- 2.7 According to the weather information obtained from the pilot questionnaire, visibility was good, wind speed was \pm 5 knots and there were no clouds.
- 2.8 A strip-down inspection of the engine after the accident revealed that a main bearing on the crankshaft had disintegrated, sending all metal particles into all the cavities of the cylinder head and resulting in the rotary valve seizure and the destruction of the brass gear and finally, engine failure.

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3. CONCLUSION

3.1 Findings

- 3.1.1 The pilot was properly licensed, medically fit and qualified to operate the flight.
- 3.1.2 The aircraft was certified, equipped and maintained in accordance with existing regulations and approved procedures. The aircraft showed no evidence of structural or systemic failure.
- 3.1.3 The airframe and flight controls were found to have had no defect prior to the accident and all damage observed was as a result of the accident sequence.
- 3.1.4 Post-examination by an authorised maintenance organisation of the engine revealed the failure of a crankshaft bearing, which led to other failures within the engine.
- 3.1.5 No documentation could be found as to why a new propeller was fitted to the aircraft.
- 3.1.6 As no proper documentation was available as to the reason for the propeller change by the previous owner, the investigator is of the opinion that the aircraft might have been involved in a propeller strike, which could have resulted in undetected damage to the engine.
- 3.1.7 The accident occurred during daylight and in good weather conditions, thus, the weather did not contribute to the accident.

3.2 Probable Cause/s

3.2.1 Engine failure during flight due to main bearing failure, followed by an unsuccessful landing due to unsuitable terrain.

4. SAFETY RECOMMENDATIONS

- 4.1.1 It is recommended that the South African Civil Aviation Authority establish a workgroup to ensure procedures for better control and completion of maintenance documents on Non Type Certified aircraft.
- 4.1.2 It is recommended that the SACAA introduce regulatory requirements to ensure improved control of maintenance documents.
- 4.1.3 It is recommended that the SACAA introduce guidance material to operators of NTC aircraft about shock load inspection requirements after the occurrence pf a prolerr strike.
- 4.1.4 It is recommended that the SACAA introduce guidance material to operators of NTC aircraft about information that should be obtained or provide by a the previous owner in the case of change of ownership.

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5. APPENDICES

- 5.1.1 Appendix A1-2 Copies of ZU-DIM Maintenance Logbook.
- 5.1.2 Appendix B1-3 Inspection report.

-END-

Report reviewed and amended by Office of the EM: AIID 29 April 2009

Appendix A 1



CIVIL AVIATION AUTHORITY SOUTH AFRICAN CIVIL AVIATION AUTHORITY

281 Middle Street Nieu Muckleneuk Private Bag X08 WATERKLOOF 0145 Tel: +27 12 346 5566 Fax: +27 12 346 1807

ENGINEERING DEPARTMENT

NUT CERTIFIED PRODUCTION BUIL	LT AND KIT BUILT	AIRCRAI	T
. Name(s) and address(es) of owner(s)	Daraton	la rice	2. ~~~
JACOBUS MARTIN QUINISSOR	POSIEUS al,	DOUISSER	WEG
QUERFESFONTELN. 8185	·······		
2. Telephone Home OZ7-6621245	Work: 027-662	1021	
^{Cell:} 082 - 804 1896	E-mail: Bust BABY	WHANTAM	· CO.2.A.
3. Registration marks: ZU - DIM.			
3.1 Aircraft Hours: OHRSNEW	3.2 Manufacturer KITPA	ANES FOR	AFRICA
3.3 Model: BusHBABY 450	3.4 Serial no: SN:	52	
1.1 Engine manufacture and models: ROTAX 582 - 99	4.2 Engine serial no: 57	42304	+
5.1 Propeller manufacturer and model: P- PROP	5.2 Propeller serial non	320FEC	204
5. Date of expiry of authority to fly :			
7.1 Date of expiry of third party in the amount of R500 000.00:			
7.2 Placards and data plate fitted in accordance with LS/1 11.4		YES-	NO
7.3 All modifications have been approved by the Commissioner		YES	NO
7.4 Approved flight manual available:		YES	NO
7.5 Date of last Mass and Balance carried out and report available(Wit	hin last 5 years)	YES	NO
7.6 Equipment List available			NO
7.7 Valid Radio station licence available (if applicable)			NO
7.8 Noise certificate available		YES	NO
 B. An annual inspection of the aircraft was made on (date)	and the airce ertified in the logbook to be in pplicable hours by which annu- d in this notification is correct	eraft is serviceabl an airworthy con ual inspection wa and that the	e and the ndition. as
above-mentioned aircraft complies in all respects with the ap other requirements of which I/ we have been notified by the C now flown a total of	pplicable requirements of the Commissioner for Civil Avi hours and the logbook acc f the last page of the logbook	ne "Provisions" ation. The airc curately reflect: ok and this noti	and any raft has s all the fication
Certified by J. FROMEMAN Si	gnature	MISAS	B OF S.A.
Date : 7- 2- 2004. Place : KOERIESTONTEN. Licence no/Approval stamp:			

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CEVELAVATION CEVELAVATION AUTHORITY CEVELASH OFF	281 Middle Street Nieu Mucklend Tel: +27 12 346 ENGINEER	euk Private Bag X08 WATERKLO 5566 Fax: +27 12 346 1807 NING DEPARTMENT	OF 0145	
ANNUAL INSP NOT CE	ECTION NOTIFICATION FO RTIFIED PRODUCTION BUI	OR MICROLIGHT, AM LT AND KIT BUILT A	ATEUR BU	U ILT,
1. Name(s) and addre	ss(es) of owner(s) ACOBUS PETRUS RIDGC CREECENT	GURDAN EXT 25 WET	BANC 1	035
2. Telephone	Home:082-8991652.	Work: 013-692	8770	
Cell: 082	8691662	E-mail: DAVE JOR	DMWEB.	C0.2A
3. Registration marks:	ZIL-DIM		F	
3.1 Aircraft Hours:		3.2 Manufacturer KITIR	WES FOR	AFRE
3.3 Model: D, CL	trary 450.	3.4 Serial no: 52	0	,
4.1 Engine manufactu	re and models: ROTAX 582/9	9 4.2 Engine serial no: 57	42304	+ .
5.1 Propeller manufac	turer and model: $P = PRIDP$	5.2 Propeller serial no: 26	268-FEC	-aGK
6. Date of expiry of a	uthority to fly: 31-05-2	2005.		
7.1 Date of expiry of t	hird party in the amount of R500 000.00:	NA .		
7.2 Placards and data	plate fitted in accordance with LS/1 11.4		YES	NO
7 3 All modifications l	nave been approved by the Commissioner		YES	NO
7.4 Approved flight m	anual available:		YES	NO
7.5 Date of last Mass	and Balance carried out and report available(W	Vithin last 5 years)	YE8	NO
7.6 Equipment List av	ailable		YES	NO
7.7 Valid Radio statio	n licence available (if applicable)		YES	NO
7.7 Valid Radio Salac	vailable		YES	NO
 8. An annual inspection requirements of Do Date of last flight overflown 9. This is to certify the above-mentioned other requirement now flown a total flying hours and will be dispatched. Certified by 	on of the aircraft was made on (date) 23 - cument LSI have been complied with and was 26-05-2005 and i 	6 - 2 - and the airco s certified in the logbook to be in a if applicable hours by which annu- ined in this notification is correct a e applicable requirements of the e Commissioner for Civil Avi hours and the logbook acc by of the last page of the logbook 	raft is serviceable an airworthy cond an airworthy cond al inspection was and that the re "Provisions" a ation. The aircra curately reflects ok and this notified	and the ition. Ind any off has all the ication

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INSPECTION REPORT ROTAX ENGINE 582 UL DCDI SERIAL No: 5742304

Scope:	Due to engine failure during flight the engine was disassembled to determine the course of failure and to inspect all internal parts fore signs of damage inside the engine witch could have led to engine failure.
Processes:	The engine was disassembled according to Rotax specification.
Findings:	
Engine:	No damage was detected on all external parts. Signs of internal damage were detected during the inspection of free turnover of the engine by hand.
Carburetor:	During the disassembly of the carburetors a metal like object was discovered inside the air intake of one of the carburetors closes to the propeller and gearbox assembly.
Gearbox:	No signs of internal damage were detected inside the gearbox assembly during the disassembly procedure.
Cylinder head:	During the disassembly of the cylinder head, metal and brass particles were detected witch were imbedded into the cylinder head and piston crown witch destroyed the cylinder head and piston.

Oil injector system:

The oil injector assembly revealed no signs of malfunction witch could have lead to insufficient oil delivery to both carburetor intake ports.

Crankcase:

The crankcase halves were separated and it revealed excessive damage to the internal parts.

Damage parts:

- 1. Metal and brass parts imbedded into the crankcase.
- 2. Seizure and destruction of the rotary shaft and brass gear.
- 3. Total destruction of the main bearing on the crankshaft. (Propeller and gearbox side)

Conclusion:

The main bearing on the crankshaft disintegrated sending all metal particles into all the cavities of the cylinder head and the rotary valve shaft assembly witch then caused rotary valve seizure and the destruction of the brass gear and finally engine failure.

Points witch could have lead to crankshaft failure.

- 1. Insufficient oil delivery to the main bearing at a certain stage during flight.
- 2. Previous damage to the crankshaft due to a prop strike of some sort.
- 3. Corrosion of the crankshaft especially at the coast or the engine standing for a long time without operation or insufficient preservation.
- 4. Over revving the engine due to incorrect prop pitch setting.
- 5. Engine not reaching it operating temperature before takeoff.
- 6. Engine ours of the engine without inspections or proper scheduled maintains.
- 7. The manufacturing process.

This inspection report reveals the finding regarding the engine and the failure of certain parts. It is however difficult to determine what exactly caused the damage to the main bearing except the seven points mentioned.

This document concludes the inspection report.

Inspector: Andre Maartens Cell: 0828044762 AP No: 185 Air O' Craft Service Centre