SOUTH AFRICAN CIVIL AVIATION AUTHORITY

Section/division **Occurrence Investigation** Form Number: CA 12-12a

AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference:	**CA18/2/3/8867**		
Aircraft Registration	**ZU-BID**	**Date of Accident**	20 November 2010		**Time of Accident**	0600Z	
Type of Aircraft	Windlass Trike		**Type of Operation**		Private		
Pilot-in-command Licence Type	Private		**Age**	44	**Licence Valid**	Yes	
Pilot-in-command Flying Experience	Total Flying Hours		40.2		Hours on Type	40.2	
Last point of departure	Harrismith Aerodrome (FAHR), Kwa-Zulu Natal Province						
Next point of intended landing	Lemon Duca Farm, Estcourt,Kwa-Zulu Natal Province						
Location of the accident site with reference to easily defined geographical points (GPS readings if possible)							
Next to R103 road, Estcourt. GPS Coordinates S28º57.143 E029º50.940							
Meteorological Information	Temperature: 20℃;Visibility: Good; Wind speed: 2 k nots; Cloud cover: None						
Number of people on board	1+1	**No. of people injured**	2	**No. of people killed**	0		

Synopsis

A pilot and passenger took off from Harrismith aerodrome on a private flight to his farm in Rosetta near Estcourt. En route to his farm, the pilot routed to another farm and began circling overhead the farm. Thefarmer who witnessed ZU-BID overhead, said that the pilot and passenger who were known to her, circled twice above the farm and waved at her, where after they flew toward sa road. The farmer then reported she heard a noise come from the direction in which the aircraft flew. The noise was followed by a momentary disruption of the farm electricity supply. The farmer then rushed to the scene to find the aircraft had crashed. The farmer immediately notified the emergency services which responded and attended to the injured occupants and transferred them to Estcourt hospital. The passenger stated that the pilot reported a loss of power before they struck the power lines.

The pilot and passenger were later transferred to St Anne's hospital in Pietermaritzburg.
The aircraft was substantially damaged in the accident sequence.

The aircraft was equipped with a GRS ballistic parachute which was removed from the aircraft by the Estcourt Fire Department.

Probable Cause

During low flight operation the aircraft suffered a loss of power and collided with high tension wires, where after the aircraft impacted the ground.

Contributory Factor/s

- Poor maintenance of the engine.
- Low flying Probable cause

IARC Date		Release Date	

AIRCRAFT ACCIDENT REPORT

Name of Owner/Operator :Weaville S
Manufacturer :Solo Wings cc
Model :Windlass Trike
Nationality :South African
Registration Marks :ZU-BID
Place :Estcourt in the Kwa-Zulu Natal Province.
Date :20 November 2010
Time :0600Z

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 Numbering of paragraphs incorrect

1.1 A pilot and passenger took off from Harrismith aerodrome on a private flight to his farm in Rosetta near Estcourt. En route to his farm, the pilot routed to another farm and began circling overhead the farm. Thefarmer, who witnessed ZU-BID overhead, said that the pilot and passenger who were known to her, circled twice above the farm and waved at her, where after they flew towards a road.

1.2 The farmer then reported she heard a noise come from the direction in which the aircraft flew. The noise was followed by a momentary disruption of theelectricity supply on the farm. The farmer then rushed to the scene to find the aircraft had crashed.The pilot stated that he descended to 150 feet above ground level (AGL) beforethe aircraft collided with the high tension power lines.

1.3 The farmer immediately notified the emergency services which responded and attended to the injured occupants and transferred them to Estcourt hospital. The passenger, whom was also theson of the pilot, stated that the pilot reported a loss of power before they struck the power lines. The pilot and passenger were later transferred to St Anne's hospital in Pietermaritzburg. The aircraft was substantially damaged in the accident sequence.

1.2 Injuries to Persons

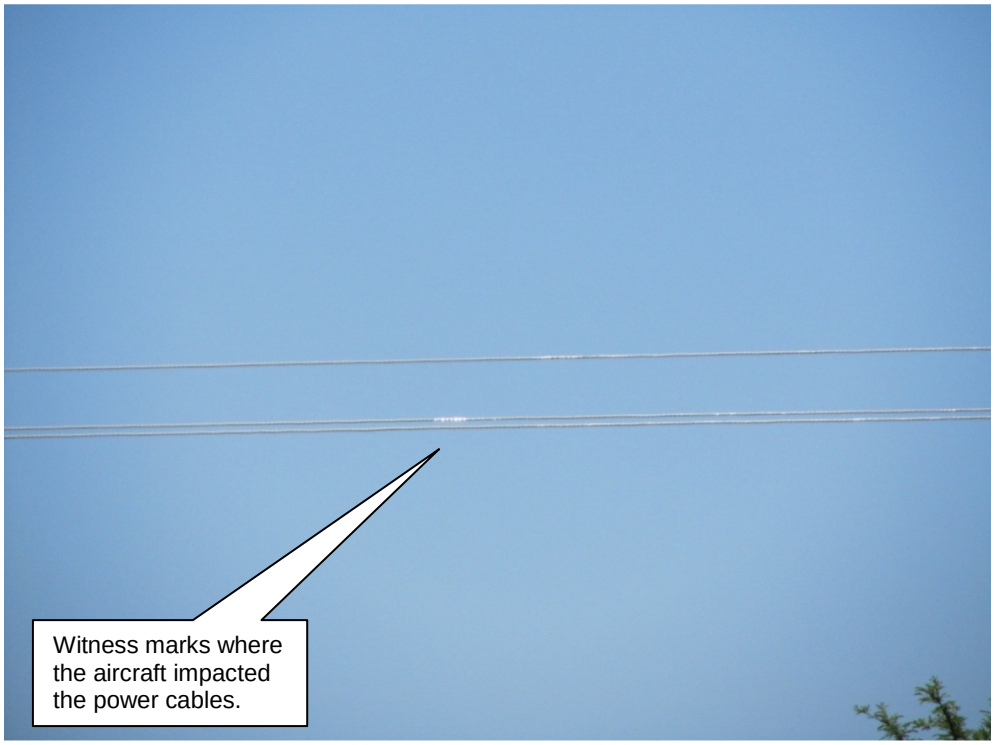
Injuries	Pilot	Crew	Pass.	Other
Fatal	-	-	-	-
Serious	1	-	1	-
Minor	-	-	-	-
None	-	-	-	-

1.3 Damage to Aircraft

Picture 1: Showing the main wreckage

1.4 Other Damage

Picture 2: Showing the high tension wires damage in relation to accident site.



Picture 3: Showing the damage to high tension wires

1.5 Personnel Information

Nationality	South African	Gender	Male	Age	44
Licence Number	0272290131	Licence Type	Private		
Licence valid	Yes	Type Endorsed	Yes		
Ratings	None				
Medical Expiry Date	31 October 2012				
Restrictions	Corrective lenses				
Previous Accidents	None				

Flying Experience :

Total Hours	40.2
Total Past 90 Days	None
Total on Type Past 90 Days	None
Total on Type	40.2

1.5.1 The pilot had not flown the aircraft in the three months prior to the accident.The flying hours tabled above was obtained from the pilot's logbook as well as other available information (i.e., SACAA pilot's file). The last entry in the pilotsLogbook was dated 9 July 2010, the day herenewed his license.

1.5.1 The pilot reported that he performed three take off and landings at Harrismith airfield prior to departing for his farm on the day of the accident.

1.5.3 The pilot performed three take off and landings and then flew to the farm near Estcourt. The approximate time taken to perform these tasks would have added approximately two hours to his total flying hours of 38.2 hours since his last flight.

1.6 Aircraft Information

Airframe :

Type	Windlass Trike	
Serial Number	WL 619	
Manufacturer	Solo Wings cc	
Date of Manufacture	1997	
Total Airframe Hours (At time of Accident)	369.	
Last Annual Inspection (Date & Hours)	29 May 2010	348
Hours since Last Annual Inspection	21.	
Authority to fly (Issue Date)	04 June 2010	
C of R (Issue Date) (Present owner)	11 June 2008	
Operating Categories	Private	

Engine :

Type	Rotax
Serial Number	4838119
Hours since New	369.
Hours since Overhaul	TBO not reached

Propeller:

Type	Warp drive
Serial Number	19491
Hours since New	369.
Hours since Overhaul	TBO not reached

1.6.1 The total airframe hours at the last annual inspectionwere348 hours. The last annual inspection was conducted by an approved person on 29 May 2010.

1.6.2 According to the pilot's log book, the aircraft was last flown on the 04 July 2010.

1.6.3 The aircraft had a valid authority to fly which had an expiry date of 29 May 2011.

1.6.4 The hours flown since the last annual inspection were calculated as being approximately 21hours.

1.7 Meteorological Information

1.7.1 The following was obtained from the Pilot's Questionnaire:

Wind direction	135°	Wind speed	02kts	Visibility	10 km
Temperature	20℃	Cloud cover	None	Cloud base	None
Dew point	Unknown				

1.8 Aids to Navigation

1.8.1 The aircraft was equipped with the standard navigation equipment and no defects were recorded before the flight.

1.9 Communications.

1.9.1 The aircraft was equipped with the standard communication equipment and no defects were recorded before the flight

1.10 Aerodrome Information

1.10.1 The accident occurred outside the boundary of any aerodrome.

1.11 Flight Recorders

1.11.1 The aircraft was not fitted with a flight data recorder (FDR) or cockpit voice recorder (CVR), and neither was required by regulations to be fitted to this type of helicopter.

1.12 Wreckage and Impact Information

1.12.1 The onsite investigation revealed that the left hand main gear of the aircraft collided with thehigh tension wires.

1.12.2 The aircraft wing impacted a tree and then impacted the ground in a nose down attitude.

1.12.3 The aircraft suffered substantial damage to the wing and the fuselage.

1.13 Medical and Pathological Information

1.13.1 The farmer immediately notified the emergency services thatattended to the injured occupants and transported themto Estcourt hospital. The two occupants were later transferred to St Anne's hospital in Pietermaritzburg.

1.13.2 There was no evidence to suggest that medical factors contributed to the accident.

1.13.3 The pilot suffered broken ribs and a punctured lung. The passenger suffered minor injuries.

1.14 Fire

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

1.15 Survival Aspects

1.15.1 The accident was deemed survivable due to the low impact forces and the fact that both the pilot and passenger were properly restrained.

1.16 Tests and Research

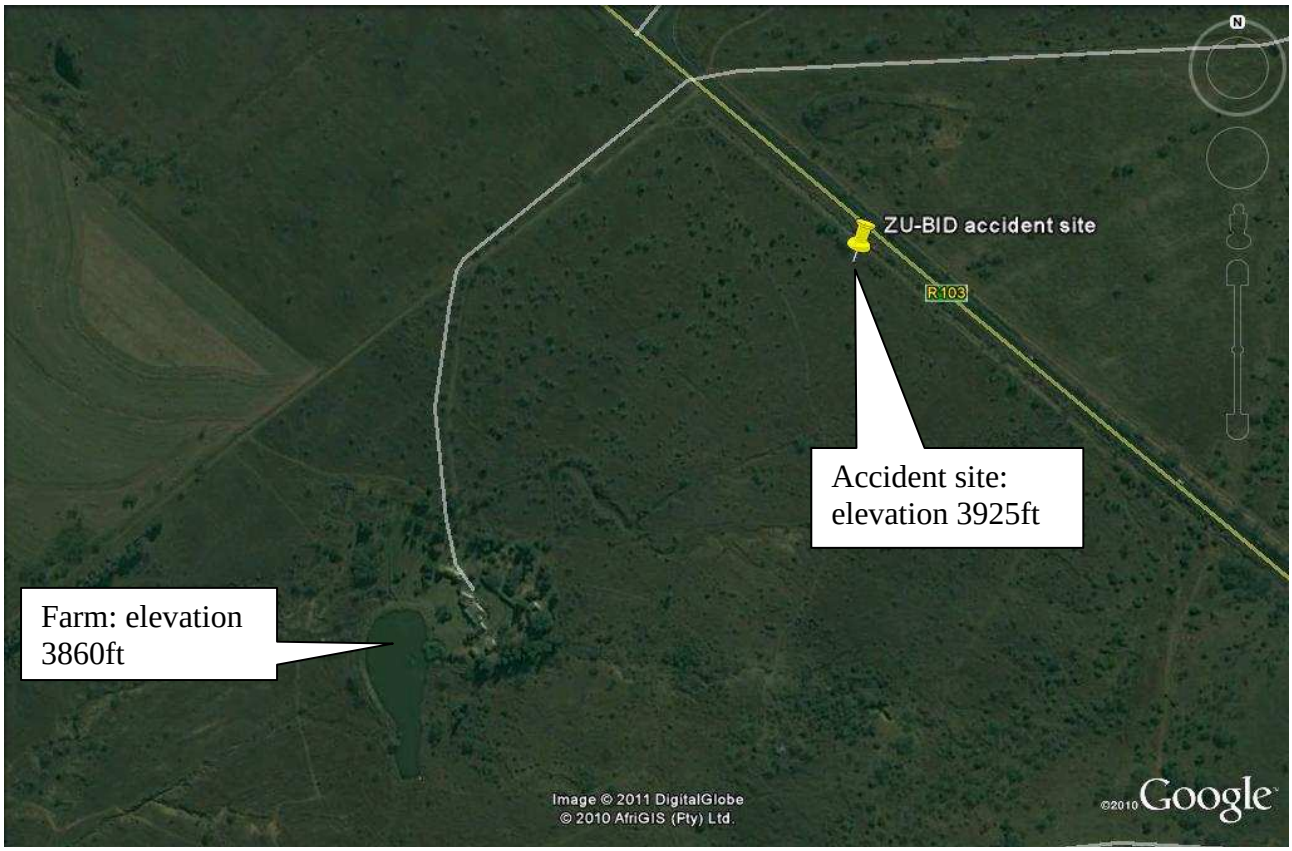
1.16.1 None considered necessary.

1.17 Organizational and Management Information

1.17.1 The aircraft was privately operated by the owner of the aircraft.

1.17.2 The aircraft was maintained by an Approved Person (A.P.) approved by the Aero Club of South Africa.

1.18 Additional Information



Picture 4: Showing the accident site in relation to the farm.

1.18.1 Height of Power lines

- The pilot stated that hedescended to 150 feet AGL (45meters) before theaircraft collided with the high tension power lines.

- The farmer reported that the aircraft was approximately 40 feet(12 meters)AGL above the farm as the aircraft circled.

- The distance from the farm house to the accident site is 1640 feet (500meters).

- The terrain from the farm house to the accident site raises byapproximately 65 feet (20 meters)

- The height of the power lines is approximately 20 feet AGL (6 meters).

1.18.2 The aircraft was equipped with a ballistic parachute which was not deployed during the accident sequence. The ballistic parachute was removed from the aircraft by the Estcourt Fire Department.

Picture 5: Damaged parachute system

Picture 6: Parachute activation pin.

1.18.3<u>Engine Teardown Inspection</u>

An engine teardown inspection was conducted on the aircraft engine by an engine overhaul facilitythat was approved by the manufacturer. Copy of report to be added to the Appendices

<u>Findings</u>

- The timing position was out of alignment. The trigger gap was set to 0.3mm. The manufacturer specifies a gap between 0.4mm and 0.5mm
  <u>Result:</u>
  This could lead to a loss of power in the engine.

- A crack was detected on one off the carburettor intake sockets.
  <u>Result:</u>
  This could lead to a loss of power in the engine.

- All four protection caps on the ignition coils were degraded.
  <u>Result:</u>

The protection caps protect the sparkplug leads from moisture entering the coils that could lead to engine failure.

1.18.4 Propeller

Two of the three propeller blades werefound to be destroyed. The third blade was undamaged but, the hub area which accommodates the blade was distorted.

During the disassembly of the propeller blades, it was noticed that the serial numbers were not a matching pair. The factory will only supply blades with the same serial number. The serial number determines the weight, length and pitch of each blade. Please elaborate on the different blades / vibration, etc

Result:

Unbalanced blades could have led to severe engine vibration during flight. Cavitation due to a wrong pitch setting, will lead to loss of thrust and engine power during flight.

The witness marks on the propeller suggests that the engine did not produce power during the accident sequence.

1.19 **Useful or Effective Investigation Techniques**

1.19.1 None

2. ANALYSIS

2.1 During a private flight en-route to his farm, the pilot routes to another farm, descended to 150 feet AGL and circled overhead a farm in order to greet the farmer who was also a friend. The pilot stated that the aircraft suffered a loss of engine power and subsequently struck the power lines. The aircraft was seen by a witness circling overhead the farm at an altitude of approximately 40feetAGL.

2.2 An engine teardown inspection revealed that the timing position was out of alignment, a crack on one off the carburettor intake sockets, the four protection caps on the ignition coils were degraded and an unmatched propeller blade. The witness marks on the propeller suggests that the engine did not produce power during the accident sequence, all of these findings on the engine could have caused or contributed to the engine losing power.

2.3 After circling overhead the farm at 40 feet AGL the aircraft engine suffered a loss of power and the left hand main gear of the aircraft collided with the high tension wires at 20 feet AGL due to rising terrain and the inability to clear the obstacles. The aircraft subsequently impacted the ground.

2.4 The aircraft was substantially damaged in the accident sequence. The occupants on board suffered injuries.

3. CONCLUSION

3.1 Findings

3.1.1 The pilot had a valid licence with the aircraft type endorsed on his licence.

3.1.2 The pilot had not flown the aircraft in the three months prior to the accident.

3.1.3 The aircraft was privately operated by the owner of the aircraft.

3.1.4 The aircraft was maintained by an Approved Person(A.P.) approved by the Aero Club of South Africa.

3.1.5 Maintenance performed on the enginewas found to be not in accordance with the engine manufacturer'sspecifications.

3.1.6 The propeller blades were found not to be of the same serial number.

3.1.7 The pilot stated that the aircraft descended to 150 feet AGL (45m) before the aircraft collided with the power lines.

3.1.8 The aircraft was operated at a low altitude prior to the collision with the power lines

3.1.9 Weather was not considered a factor in this accident.

3.2 Probable Cause/s

3.2.1 During low flight operation the aircraft suffered a loss of power and collided with high tension wires, where after the aircraft impacted the ground.

3.3 Contributory Factor/s

3.3.1 Poormaintenance ofthe engine.

3.3.2 Low flying.

4. SAFETY RECOMMENDATIONS

4.1 None considered necessary

5. APPENDICES

5.1 **Appendix A**
Engine teardown report

INVESTIGATION REPORT

ROTAX 503 DCDI

Engine No.: 4838119

Strip down of engine

Purpose:

To determine the reason for power loss during flight.

External inspection :

The engine was inspected externally for any defects.

Internal inspection:

The engine was disassembled and all internal parts was inspected for any defects or damage witch could have led to power loss during flight.

NOTE: **No statement can be made regarding the condition of the:**

1. **Fuel lines from the fuel tank trough the fuel filter to the fuel pump rooting to the carburetors.**
2. **Throttle cabals from the controls to the carburetors.**
3. **Fuel and witch octane was been used.**
4. **Propeller blades and at what pitch it was set.**

External inspection :

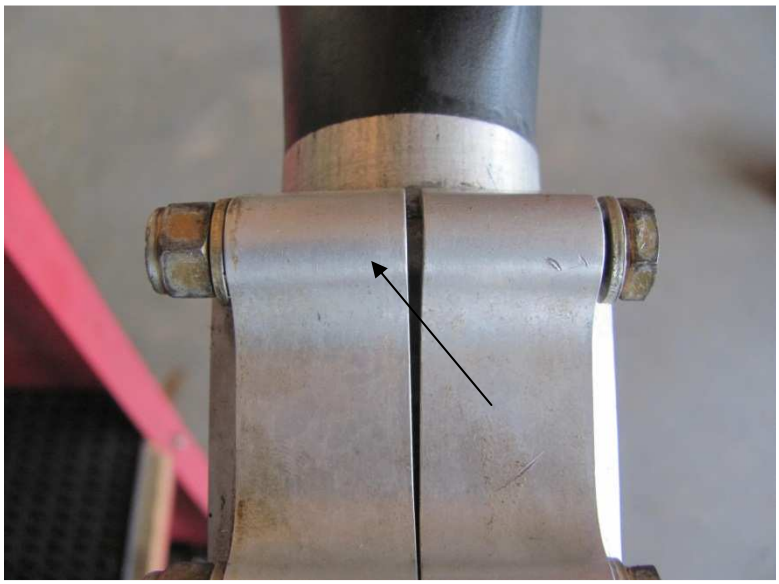
No signs of any defects was noticeable to the engine and gearbox casings and housings.

Damaged parts:

1. Carburetor intake socket.
2. Propeller hub.

Carburetor intake socket Figure 1

A crack was detected on one off the carburetor intake sockets. With the engine inverted on the aircraft, the crack could have been miss looked during a pre-flight inspection and if the crack did appear during flight, a sudden power loss could have occurred. See figure 1.



Propeller hub Figure 2

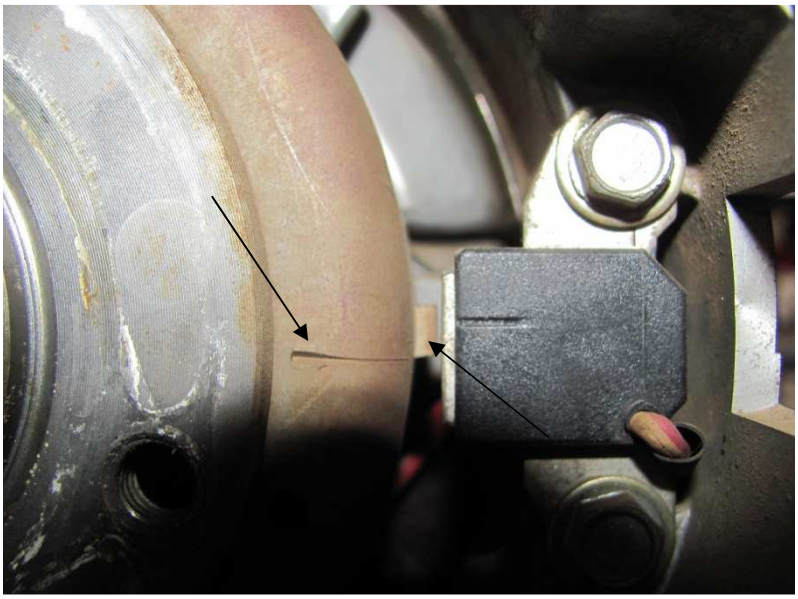
During the accident two of the three propeller blades was destroyed. The third blade was perfectly in tacked but, the hub aria witch accommodates the blade was badly distorted. It mite seem that the hub was in a previous accident and was reused. No distortion was detected on the rest of the hub specially in the mounting aria of the two damaged blades.

Blade Serial No.: Figure 3

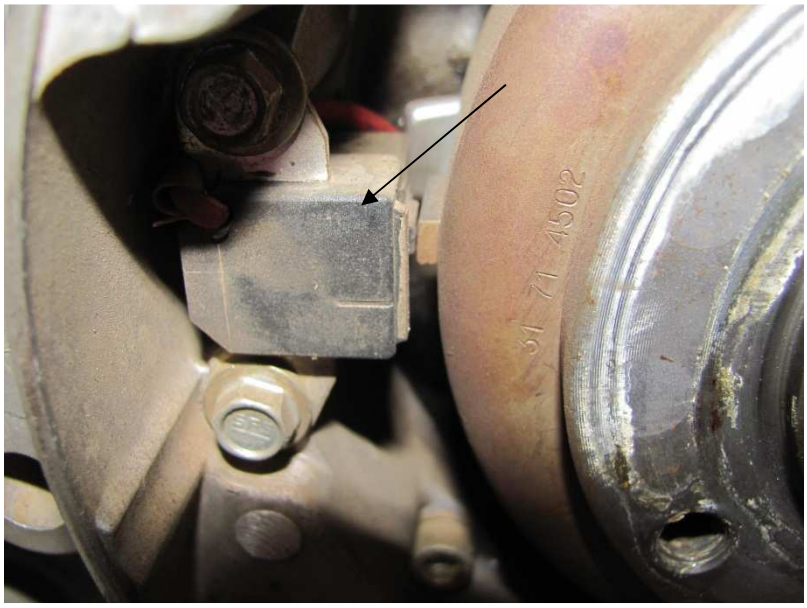
With the dissemble of the propeller blades, it was noticed that the serial numbers were not a matching pear. See Figure 3. The factory will only supply blades with the same serial number. The serial number determents the weight, length and pitch of each blade. Unbalanced blades could have lead to severe engine vibration during flight. Cavitations due to a wrong pitch setting, will lead to loss of thrust and engine power during flight.

Ignition Coils Figure 4

All four protection caps on the ignition coils was totally degraded. The protection caps protects the sparkplug leads from moisture entering the coils that could lead to engine failure. See Figure 4.



Timing Position Mark Figure 5



Trigger gap (Air gap) Figure 6

Before the engine was dissembled, the timing position was inspected as per the Rotax specification.
The timing position was out of line. See Figure 5.
The trigger gap was set to the wrong setting (0.30 mm) (Min 0.4 mm Max 0.5 mm) See Figure 6
Due to the wrong settings the engine could not perform to its full potential.

Compiled by:

..... Date: ……..
For: Director of Civil Aviation

Investigator-in-charge: ……. Date: ……..

Co-Investigator: ……..……. Date: ……