



AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference:	CA18/2/3/8619	
Aircraft Registration	ZU-GAM	Date of Accident	22 February 2009		Time of Accident	1515Z
Type of Aircraft	Pipistrel Taurus Glider		Type of Operation	Private		
Pilot-in-command Licence Type	Glider	Age	50	Licence Valid	Yes	
Pilot-in-command Flying Experience	Total Flying Hours	Approximately 1101.4		Hours on Type	Unknown	
Last point of departure	Geluk Private Game Lodge – Limpopo					
Next point of intended landing	Geluk Private Game Lodge – Limpopo					
Location of the accident site with reference to easily defined geographical points (GPS readings if possible)						
Geluk Private Game Lodge, approximately 86 km north-west of Thabazimbi, GPS Position: S24°20,958', E026°58,467'; Elevation = 2 920 ft ASL						
Meteorological Information	Wind: 340 @ 7 knots ; Temperature: 27 °C; CAVOK					
Number of people on board	1+0	No. of people injured	0	No. of people killed	1	
Synopsis	<p>A pilot took off unaccompanied from his private farm on a private flight on 22 February 2009 at approximately 1513Z. Witness reported that he saw the aircraft climbing out and after it had reached a considerable height, he heard what sounded like an engine being switched off.</p> <p>The witness further reported that a few seconds after the engine was cut off, he then saw the aircraft rocking, i.e. moving from side to side followed by at least two fore-aft pitching motions, followed by what he described as tumbling tail over nose up to three times. Moments later the aircraft collided with a tree, before crashing to the ground in a nose-down attitude. The aircraft then bounced back on its tail and settled into a wings-level position, facing approximately 75 degrees east.</p> <p>The aircraft was destroyed and the pilot was fatally injured.</p>					
Probable Cause						
The pilot failing to maintain flying speed which led to the pilot losing control of the aircraft in flight and the aircraft stalled before crashing. It could not be conclusively determined why the pilot lost control of the aircraft.						
Contributory factor/s						
Limited experience in gliders.						
IARC Date				Release Date		

1.1.6. Figure 1 shows the flight data as extracted from an LX 8000 digital navigation unit which was found fitted to the aircraft.

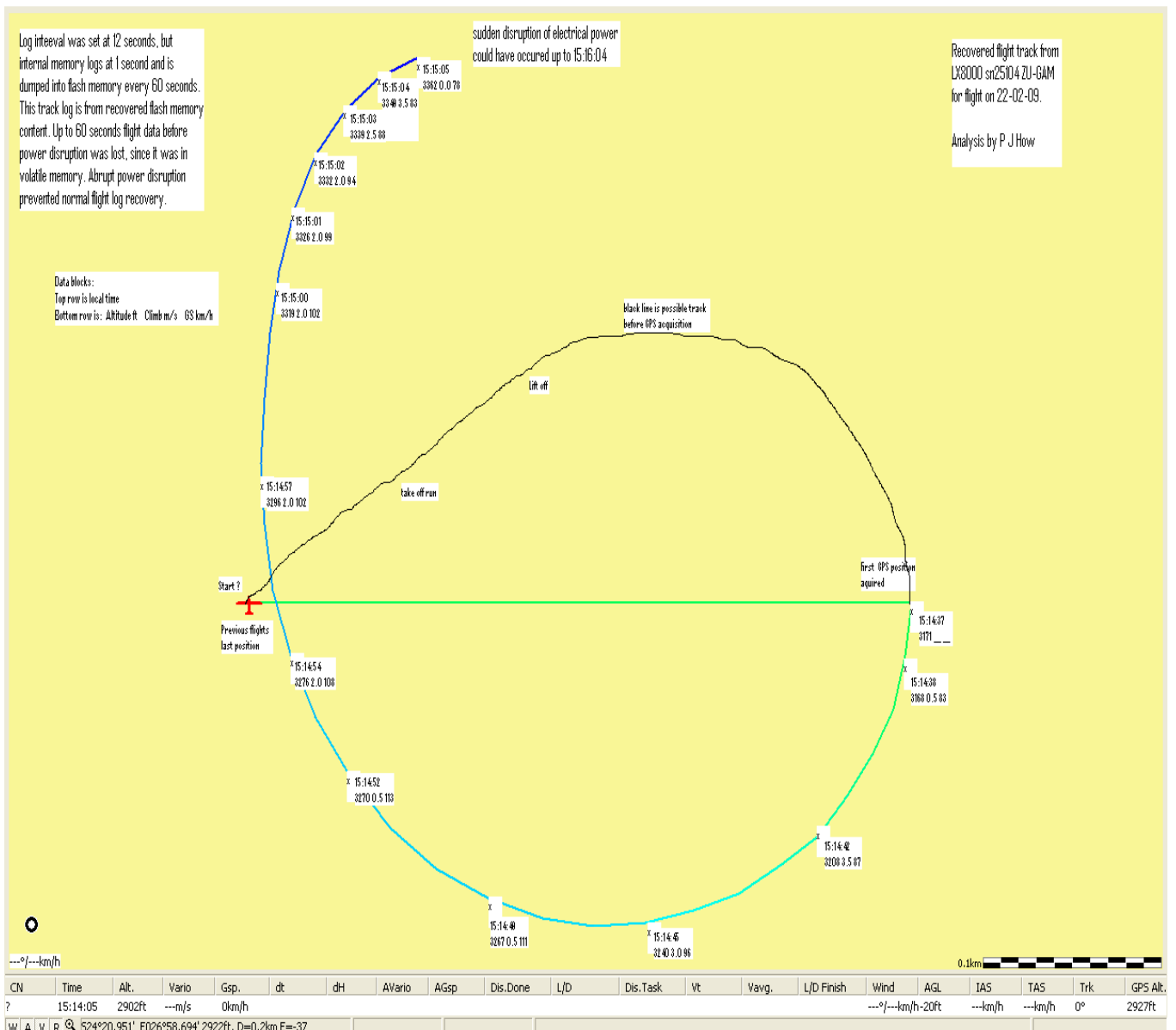


Figure 1: Flight data

1.2 Injuries to Persons

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

1.3 Damage to Aircraft

1.3.1. The aircraft was destroyed.



Photo 1: Damage to aircraft

1.4 Other Damage

1.4.1. There was no other damage.

1.5 Personnel Information

Nationality	South African	Gender	Male	Age	50
Licence Number	*****	Licence Type	Glider		
Licence valid	Yes	Type Endorsed	Yes		
Ratings	None				
Medical Expiry Date	11 November 2011				
Restrictions	Medical restrictions – to wear corrective lenses				
Previous Accidents	None				

Flying Experience

The pilot successfully completed a three-hour refresher training session for this type of aircraft on Saturday 21 February 2009, in the presence of a certified instructor. The refresher included several take-offs and landings and in-flight engine shut-downs and stowages, however, the pilot's exact flying hours on gliders at the time of the accident could not be determined.

Aeroplanes:

Total Hours	977,3
Total Past 90 Days	Unknown
Total on Type Past 90 Days	Unknown
Total on Type	Unknown

Note: According to available records, the pilot had flown a total of 977,3 hours on aeroplanes at the time of his last licence renewal application on 6 October 2007. The pilot's exact flying hours at the time of the accident could not be determined as his log book could not be found.

Helicopters:

Total Hours	118,1
Total Past 90 Days	Unknown
Total on Type Past 90 Days	Unknown
Total on Type	Unknown

Note: According to available records, the pilot had flown a total of 118,1 hours on helicopters at the time of his last licence renewal application on 2 April 2008. The pilot's exact flying hours at the time of the accident could not be determined as his log book could not be found.

1.6 Aircraft Information

Airframe :

Type	Taurus Glider	
Serial Number	034 T 503	
Manufacturer	Pipistrel D.O.O.	
Year of Manufacture	2008	
Total Airframe Hours (At time of Accident)	10,18	
Last annual Inspection (Date & Hours)	12 December 2008	6.00
Hours since Last annual inspection	4,18	
Authority to Fly (Issue Date)	12 December 2008	
C of R (Issue Date) (Present owner)	5 December 2008	
Operating Categories	NTCA Commercial	

Engine :

Type	Rotax 503
Serial Number	6479137
Hours since New	7,95
Hours since Overhaul	TBO not yet reached

Propeller (retractable):

Type	Pipistrel WO
Serial Number	34
Hours since New	7,95
Hours since Overhaul	TBO not yet reached

Note: All hours given above are as taken from aircraft's flight folio (log book), as the last entry in the folio was made on 16 February 2009 at 10,18 airframe hours. There was no evidence of any engine or propeller change. The exact airframe, engine and

propeller hours at the time of the accident could thus not be determined.

1.6.2. Weight and Balance

1.6.2.1. The aircraft has an empty weight of 297 kg and a maximum take-off weight (MTOW) of 472,5 kg. Although there were no entries in the folio of the last fuel uplift, approximately 25 litres of fuel were drained from the aircraft after the accident. The aircraft was also fitted with a water ballast tank with a capacity of 9 litres, and the tank had not been filled with water for this flight.

1.6.2.2. The weight of the pilot is reported to have been 87 kg during his last aviation medical examination on 10 November 2008 (medical certificate was valid until 30 November 2009), and the aircraft was certified to carry a minimum pilot load of 62 kg (or a minimum cockpit load of 82 kg), and a maximum pilot load of 159 kg (or a maximum cockpit load of 179 kg). The weight and balance of the aircraft at the time of the accident could, however, not be determined accurately.

	Weight (kg)	Moment arm (m)	Moment (m.kg)
A/C empty weight	297	0,682	202,554
Pilot	87	-0,541	-47,067
Fuel (25 litres @ 0.76)	19	0,215	4,085
Total Weight	403	0,396	159,572

Table 1: Weight and balance

1.6.2.3. The centre of gravity (C of G) limits of this type of aircraft are between 0,238 m and 0,429 m respectively, and according to the table in 1.6.2.2, the aircraft was within its C of G limits (approximately 0,396 m).

1.7. Meteorological Information

1.7.1. The information given below was obtained from an official weather report given by the South African Weather Services:

Wind direction	340°	Wind speed	7 knots	Visibility	10 000 m
Temperature	27 °C	Cloud cover	Scattered	Cloud base	4 500 ft
Dew point	17 °C				

1.8 Aids to Navigation

1.8.1. The aircraft was fitted with standard navigation equipment as approved at the time of certification by the Regulator, and no defects in against this equipment were reported prior to the accident or during the accident flight.

1.9 Communications

1.9.1. The aircraft was fitted with standard communication equipment as approved at the time of certification by the Regulator, and no defects in this equipment were reported prior to the accident or during the accident flight.

1.9.2. No evidence could be found that would suggest that a mayday call was made before or during the accident sequence.

1.10 Aerodrome Information

1.10.1. The accident did not take place at an aerodrome. It occurred in a flat, bushy area, on a privately owned farm approximately 86 km north-west of Thabazimbi. The GPS coordinates are S24°20.958', E026°58.467', at an elevation of approximately 2 920 ft above sea level.

1.11 Flight Recorders

1.11.1. No flight data recorder (FDR) or cockpit voice recorder (CVR) was fitted to this aircraft and none were required by the regulations.

1.12 Wreckage and Impact Information

1.12.1. The aircraft was seen tumbling tail over nose towards the ground before crashing against a tree. The right wing was caught in the tree.

1.12.2. The aircraft seemed to have been spinning in an anticlockwise direction when it hit the tree, because it was twisted into a clockwise direction and the right wing was severed approximately 2,5 m from the wing root.



Photo 2: View from the front and impact marks



Photo 3: View from behind and aircraft damage

1.12.3. The aircraft then bounced back approximately one metre from the first point of impact, and then it fell back, hitting the ground with the tail-plane.

1.12.4. The tail-plane and fin were severed from the fuselage during impact, but were kept retained in position by the rudder cables.

1.12.5. As there was no forward motion, there were no skid marks. The wreckage was localised at the impact site and most of the debris found, such as the canopy fragments, composite material and propeller fragments, were within a 10 m-radius from the main wreckage.

1.13 Medical and Pathological Information

1.13.1. The pilot was fatally injured in the accident.

1.13.2. The post-mortem and toxicology reports were not available at the time of compilation of this report. Should these results have a bearing to this report, they will be attached to this report as and when obtained.

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 not considered survivable because of the damage to the aircraft,

particularly to the cockpit/cabin area.

1.15.2. The witness was on the accident scene shortly after the accident and attempted to evacuate the pilot from the aircraft, but was very cautious as he thought the aircraft might burst into flames. As the pilot had already been fatally injured, the witness was later helped by other farm dwellers to remove the body from the aircraft. The pilot was found wearing his seatbelt properly.

1.15.3. The police arrived at the scene approximately an hour after the accident.

1.15.4. The aircraft was fitted with a ballistic parachute, but it had not been used during the accident sequence.

1.16 Tests and Research

1.16.1. The instructor that had given the pilot his conversion training arrived at the scene of the accident a day after the accident. In the presence of the accident investigators, he attempted to start the engine; the engine started normally. Since the engine start was normal, and because the pilot would have shut down the engine in flight to enable the aircraft to glide, it was concluded that the engine and its operation were not a contributing factor to the accident.

1.16.2. The actuator shaft that extends and retracts the engine, which also helps keep the engine in the extended position when in use, was found bent. It also had several dents and scuff marks, and it was therefore also concluded that the engine was not fully retracted when the aircraft crashed.



Photo 4: Bent extension/retraction shaft

1.17. Organizational and Management Information

- 1.17.1. The pilot had a valid glider pilot's licence issued by the Soaring Society of South Africa (SSSA).
- 1.17.2. This was a private flight.
- 1.17.3. The aircraft had a valid authority to fly, with an expiry date of 12 December 2009. The last annual SSSA airworthiness inspection was certified on 12 December 2008 at 7,75 airframe hours and 6,25 engine hours.
- 1.17.4. The aircraft was privately owned and was maintained by an approved person (AP) accredited by the SSSA.

1.18 Additional Information

- 1.18.1. This aircraft was new, and the pilot had taken delivery of it on 20 February 2009, the Friday preceding the Sunday on which the accident occurred.
- 1.18.2. The pilot also had valid aeroplane and helicopter pilot's licences.
- 1.18.3. The pilot did not have an aerobatics rating.
- 1.18.4. The pilot initially completed conversion training (approximately three hours) on this type of aircraft on 11 February 2008, but SSSA had recommended that he should go through another test with the instructor when his new aircraft was delivered, which he did on 21 February 2009 and he flew another 3 hours, as the aircraft was only delivered almost a year after the initial conversion training.

1.19 Useful or Effective Investigation Techniques

- 1.19.1. None.

2. ANALYSIS

- 2.1. This was a private flight and the pilot had a valid glider pilot's licence. According to available records on 2 April 2008, the pilot had flown 118,1 and 977,3 hours on helicopters and aeroplanes respectively.
- 2.2. The aircraft was new, there was no evidence of maintenance anomalies and/or defects reported with the aircraft prior to the flight, and the engine was found to be operating normally.
- 2.3. The witness reported that a few seconds after the engine was cut off, he saw that the aircraft was rocking, i.e. moving from side to side followed by at least two fore-aft pitching motions, followed by what he described as tumbling, tail over nose, of up to three times, and moments later the aircraft hit a tree before crashing to the ground.
- 2.4. The pilot's limited experience of this type of aircraft could have made it difficult for him to recover from the rocking motion; and the aircraft would subsequently have tumbled over and crashed to the ground. It was destroyed on impact.

3. CONCLUSION

3.1 Findings

- 3.1.1. The pilot had a valid glider pilot's licence issued by the SSSA. The pilot also had valid aeroplane and helicopter pilot's licences.
- 3.1.2. This was a private flight.
- 3.1.3. The pilot had flown a total of 118,1 hours on helicopters at the time of his last licence renewal application on 2 April 2008, and a total of 977,3 hours on aeroplanes at the time of his last licence renewal application on 6 October 2007.
- 3.1.4. The aircraft had flown a total of 10,18 airframe hours and a total of 7,95 engine hours on 16 February 2009.
- 3.1.5. The aircraft had a valid authority to fly, which was issued 12 December 2008, and had an expiry date of 12 December 2009. The last annual SSSA airworthiness inspection was certified on 12 December 2008 at 7,75 airframe hours and 6,25 engine hours.
- 3.1.6. The aircraft was privately owned and was maintained by an AP accredited by the SSSA.
- 3.1.7. The aircraft was new, and the pilot had taken delivery of the aircraft on 20 February 2009, the Friday preceding the Sunday on which the accident occurred.
- 3.1.8. The pilot had successfully completed his refresher training to this type of aircraft on Saturday 21 February 2009, in the presence of a certified instructor. However, the pilot's exact flying hours on gliders could not be determined.
- 3.1.9 The engine was operating normally.

3.2 Probable Cause/s

- 3.2.1. The pilot failing to maintain flying speed which led to the pilot losing control of the aircraft in flight and the aircraft stalled before crashing. It could not be conclusively determined why the pilot lost control of the aircraft.

3.3 Contributory factor/s

- 3.2.1 Limited experience in gliders.

4. SAFETY RECOMMENDATIONS

- 4.1. Following this accident and many others, it is recommended that the South African Civil Aviation Authority consider introducing a minimum number of flight hours to be completed for conversion training before a pilot can be rated on a type of aircraft.

5. APPENDICES

- 5.1. Appendix 1 – Report by the SSSA
- 5.2. Appendix 2 – Manufacturer’s weight and balance calculation

Compiled by:

Prince Mereotlhe

Date:

For: Director of Civil Aviation

Investigator-in-charge:

Date:

Co-Investigator:

Date:

APPENDIX 1

Report from the Soaring Society (SSSA)

SSSA – Accident investigation record

Glider – Taurus ZU GAM

Accident occurred – 1 March 2009

Fatalities – 1

Time – 17.15

Weather – Light winds – cumulus – no storm presence.

This is a preliminary report and may contain inaccuracies and has been prepared by D.W. Mortimer after an on-scene investigation and inspection of the site on 22 March 2009. The inspection was conducted in the presence of the first witness to the accident sequence described herein and included Mr Keith Ashman (SSSA operations director) and the Aircraft importer and agent, Mr Kobus Nel.

Witnesses

A witness (the manager of the farm on which the runway is located) reported witnessing the glider manoeuvring to the south of the runway and coming toward her at what could have been between 500 and 1000 ft above the ground. This was deduced by asking her what height an aircraft was that arrived during our joint inspection.

She described that she did not observe it further but had been listening to the engine developing normal power and then hearing the engine stop in what could have been 30 seconds. About a minute later she heard the sound of impact.

A second witness (a farm hand) witnessed the accident and described a rocking motion i.e. from side to side followed by at least two fore-aft pitching motions followed by what he described as tumbling of up to three times, all of which he described as straight down.

Wreckage

The glider with all the components and flight control surfaces was accounted for in the immediate vicinity of the main wreck (about 10 m). A small section of the leading edge of the fin was not located.

Control continuity for the rudder pedals was confirmed.

The automatic Flaperon connection could not be confirmed as the impact forces had disengaged the elements.

The fuselage was crushed upward with very little backward displacement, indicating a nose-down impact of 30 degrees with the ground.

The fuselage was approximately 2,5 m from the general centre of a tree with a height of about 8 m.

The witness marks on the right wing indicate that the right wing was low about 30 deg.

This was clearly visible from the direction of scuffmarks on that wing. The wing was twisted off the main spar and this had allowed the outer shell of the wing to travel vertically down the tree.

The right wing spar was severed about 2,5 m from the root rib. The main spar root fittings remained intact.

The remains of the right wing stretched from the ground to a height of about 6 m in the tree.

The left wing was largely intact but exhibited forward motion due to rearward displacement fractures @ 45 deg. on most of the wing and 30 deg. inward scuff marks on the lower wing surface, indicating a clockwise rotation on ground contact.

The fuselage was found upright with the fin and tailplane in an approximately normal orientation. The tailplane and fin remained connected to one another but were severed from the fuselage and retained in position by the rudder cables.

The tailplane had made contact with the ground, with grass roots embedded in the broken surface of the tailplane and fin.

This suggests that the entire assembly broke off due to a twisting action some metres above the ground at the time of the first contact between the wing and the tree, causing the assembly to swing in an arc and hitting the ground independently of the fuselage, but still connected by the rudder cables.

Engine operation

The engine operation during the shutdown sequence is initiated by at first switching off the ignition (the switch was found in the off position but with the fuel in the on position). The slowing down of the propeller, which is assisted, by the slowing of the glider follows this. When the propeller stops rotating, the retraction process starts automatically. When the pylon has retracted about 15 deg., a cable-activated mechanism engages and a spring-loaded détente mechanism moves the propeller to an aligned stowing position.

The engine pylon extension cylinder push rod was found to have buckled in three places from a fully extended, erect position, indicating that the engine retraction process had not yet begun. The propeller was also not in its détente during initial impact, as evidenced by the witness marks and damage to the engine doors and propeller, which showed that the propeller had been about 15 deg. off the stowing position at the time of impact.

The propeller was found in the stowed position and in its détente, but a consensus was formed that this had been achieved when the engine bounced out after the first impact and with the détente now released, it had locked back in with the rebound.

No other possible reason could be postulated from the evidence.

Controls and other systems

The flaps were selected in the landing position, which might also have been selected for slow flight for the engine retraction sequence. This process had been initiated by the evidence of the ignition being in the off position and the witnesses confirming the cessation of engine noise.

The elevator trim was set fully aft.

The fuel selector was open.

The ignition was off.

The undercarriage was up (retracted).

The tail wheel assembly exhibited displacement to the right with a tail wheel tire mark on the left side of the fin structure. These marks indicate a clockwise rotation of the tail wheel assembly until ground contact, consistent with the theory of separation of the assembly

from the airframe before the fuselage made contact with the ground.

Structure

The fuselage was crushed upwards from the nose to the wing/fuselage juncture

The rear fuselage was substantially intact from behind the wing/fuselage juncture up to the fin/fuselage juncture.

The fin and tailplane remained connected to one another with no damage evident in the connection, but were completely separated from the fuselage.

The elevator was attached and functional.

The rudder was largely undamaged.

The tail wheel assembly was detached and exhibited impact damage on the left side.

The left wing and spar were largely intact with a functioning flaperon, but exhibited 30-degree chordwise inward scuffmarks from contact with the ground on the lower surface.

The leading edge was damaged at the point of contact with bushes that had arrested the wing's path. The forward movement at the tip had been considerable and this coupled with no forward movement at the fuselage junction indicates a clockwise rotation at impact. A white witness mark on the back of the spar caused by the hole in the fuselage also bore testimony to a rotational motion in the same direction.

The right wing's main spar had been broken through 2,5 m from the root rib and at several places further out. The wing profile was twisted out of the spar, which appears to have resulted in the wing profile being turned through approx. 90 deg. and then traveling through the tree branches vertically. In addition to this, the witness scratches on the lower surface were angled at about 30 deg. toward the root rib from the leading edge. This reinforces the theory that the right wing had been angled down about 30 deg. at the first point of impact. Most of the right wing was found in the tree, from the ground to about 6 m above ground.

The author has therefore drawn the conclusion that the glider was in a clockwise spin of about 30 deg. nose-down, with the right wing 30 deg. down from the horizontal, particularly as no evidence of forward speed exists, corroborating the one eyewitness account.

The author did not interview the principal eyewitness and the testimony is therefore hearsay, albeit from the other eyewitness and others.

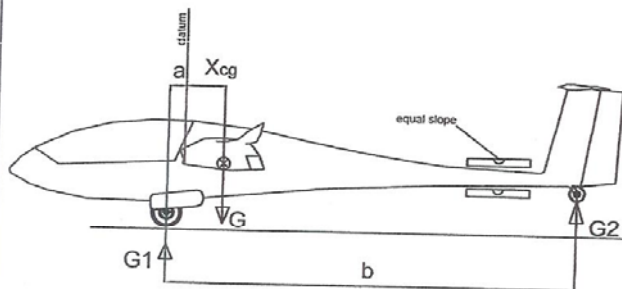
APPENDIX 2

The last weight and Balance sheet issued by manufacturer prior to aircraft release

T-034

Weighing and C.G. calculation - empty mass

1	date of weighing	/	1. example	2. example	3. example				
2	accomplished by	/							
3	date of "Equipment list"	/							
4	main wheel Lh	G _{1 Lh}	kg	123,0	123,4	122,0	135,4		
5	main wheel Rh	G _{1 Rh}	kg	124,4	124,8	123,5	130		
6	main wheel total	G ₁	kg	247,4	248,2	245,5	265,4		
7	tail wheel	G ₂	kg	49,6	48,8	47,5	50,9		
8	distance	a	mm	22	24	23	25		
9	distance	b	mm	4402	4406	4400	4395		
10	empty mass = (6+7) G _{empty}		kg	297,0	297,0	293,0	316,3		
11	empty mass C.G. X _{CG.empty}		mm	713	700	690	682		
12	max cockpit load without w.ballast (from "Empty mass c.g. limits" diagram)		kg	180,0	175,5	169,0	179,2		



Component mass	kg	kg	kg	kg
Lh wing incl.flaperon	44,2			
Rh wing incl.flaperon	43,9			
Fuselage - complete	222,4			
Horiz. tail	5,8			
Empty mass	316,3			

Empty mass is with equipment and accessories per equipment list, and without occupants, fuel, baggage and water ballast.
 $X_{CG.empty} = (G_2 \cdot b) / G_{empty} - a$

Useful load distribution

13	max mass	kg	472,5	472,5	472,5	472,5	472,5	472,5	472,5
14	max useful load = (13-10)	kg	175,5	175,5	179,5	156,2			
15	max cockpit load without w.ballast (declared, see Notes)	kg	175,5 less fuel less baggage	175,5 less fuel less baggage	169,0	156,2			
16	min cockpit load without w.ballast (from "Empty mass c.g. limits" diagram)	kg	86,0	82,0	78,0	82			
17	Inspector signature & stamp	/							

Notes: • Declared max cockpit load without water ballast is: 14 - fuel - baggage, if 14 is less than, or equal to, 12, 12, if 14 is more than 12.

- Water ballast is installed for solo flight with lightweight pilot for not to exceed aft c.g. limit. Min cockpit load may be reduced for 2,3 kg per each litre of water ballast.
- If water ballast is left in the tank for duo flight, max cockpit load must be reduced for 2,3kg per each litre of water ballast.
- Influence of fuel and baggage on aircraft c.g. (and corresponding cockpit load) is neglectable.
- Max mass of single occupant (due to structural load per seat) is 110kg.
- Fuel [kg] = 0,76 kg/litre × litres.

Final assembly quality inspector: LOBAL

Signature: [Signature]



Date: 19.2.2008