SOUTH AFRICAN CIVIL AVIATION AUTHORITY

Section/division Accident and Incident Investigations Division Form Number: CA 12-57

LIMITED OCCURRENCE INVESTIGATION REPORT – FINAL

Reference Number	CA18/2/3/10435										
Classification	Accident			**Date**	11 November 2023			**Time**	1226Z		
Type of Operation	Private (Part 94)										
Location											
Place of Departure	Worcester Aerodrome (FAWC), Western Cape Province			Place of Intended Landing				Worcester Aerodrome (FAWC), Western Cape Province			
Place of Occurrence	On a farm near Tulbagh, 22 nautical miles north-west of Worcester Aerodrome (FAWC)										
GPS Co-ordinates	Latitude	33°15'44.70" S		Longitude	019°10'19.15" E			Elevation	876 feet		
Aircraft Information											
Registration	ZS-GNK										
Make; Model; S/N	Alexander Schleicher GMBH & CO., ASW-20F (Serial Number: 20-190)										
Damage to Aircraft	Substantial				Total Aircraft Hours			712.7			
Pilot-in-command											
Licence Type	Glider Pilot Licence			Gender	Male			Age	64		
Licence Valid	Yes	Total Hours		306.4		Total Hours on Type			306.4		
Total Hours 90 Days	24.7			Total Flying on Type Past 90 Days				24.7			
People On-board	1 + 0	**Injuries**	0	**Fatalities**	0		**Other (on ground)**		0		

What Happened

On Saturday morning, 11 November 2023, a pilot on-board an ASW-20F glider with registration ZS-GNK was aero-towed into the air from Worcester Aerodrome in the Western Cape province with the intention to return to the same aerodrome. The private flight was conducted under visual meteorological conditions (VMC) by day and under the provisions of Part 94 of the Civil Aviation Regulations (CAR) 2011 as amended.

The pilot stated the following: *"Two gliders were flying together to Porterville. At Tulbagh, below the 4500 feet (ft) cloud base above mean sea level, the Witzenberg ridge did not work that well and as I had quite a bit of height, I communicated with the other pilot that I would go see if Saronsberg was working, even though there was very little wind on the ridge. I got to Saronsberg at 4500 ft, it was not working and there was hardly any wind. I said to the other pilot that we should turn back. We both got back to Witzenberg quite low and talked about flying straight to Tulbagh Aerodrome and land there. As I flew towards the aerodrome, I thought I had some lift and tried to work it way too long, fell out of it, and was too low to reach the aerodrome. I did believe that I was in the perfect position to land beautifully, should the lift not work, and found a field that 'looked freshly cut', uphill and directly into the wind.*

The landing went as planned. I aborted the non-exothermal, passed over the fence, and landed exactly where I intended to. However, a big surprise awaited whereby the freshly cut field was a wheat field (I learned later it was Barley). At that point, I knew that I had to land on top of the wheat. The left wing, which was the slightly uphill side of the slope, caught the wheat first. The glider ground-looped and at some point, you are purely a passenger (lost control).”

The glider sustained structural damage to its tail boom, lower left wing and aileron (which required major repairs). No person was injured.

The accident occurred during daylight at Global Positioning System (GPS) co-ordinates determined to be 33º15’44.70” South 019º10’19.15” East, at an elevation of 876 feet (ft).

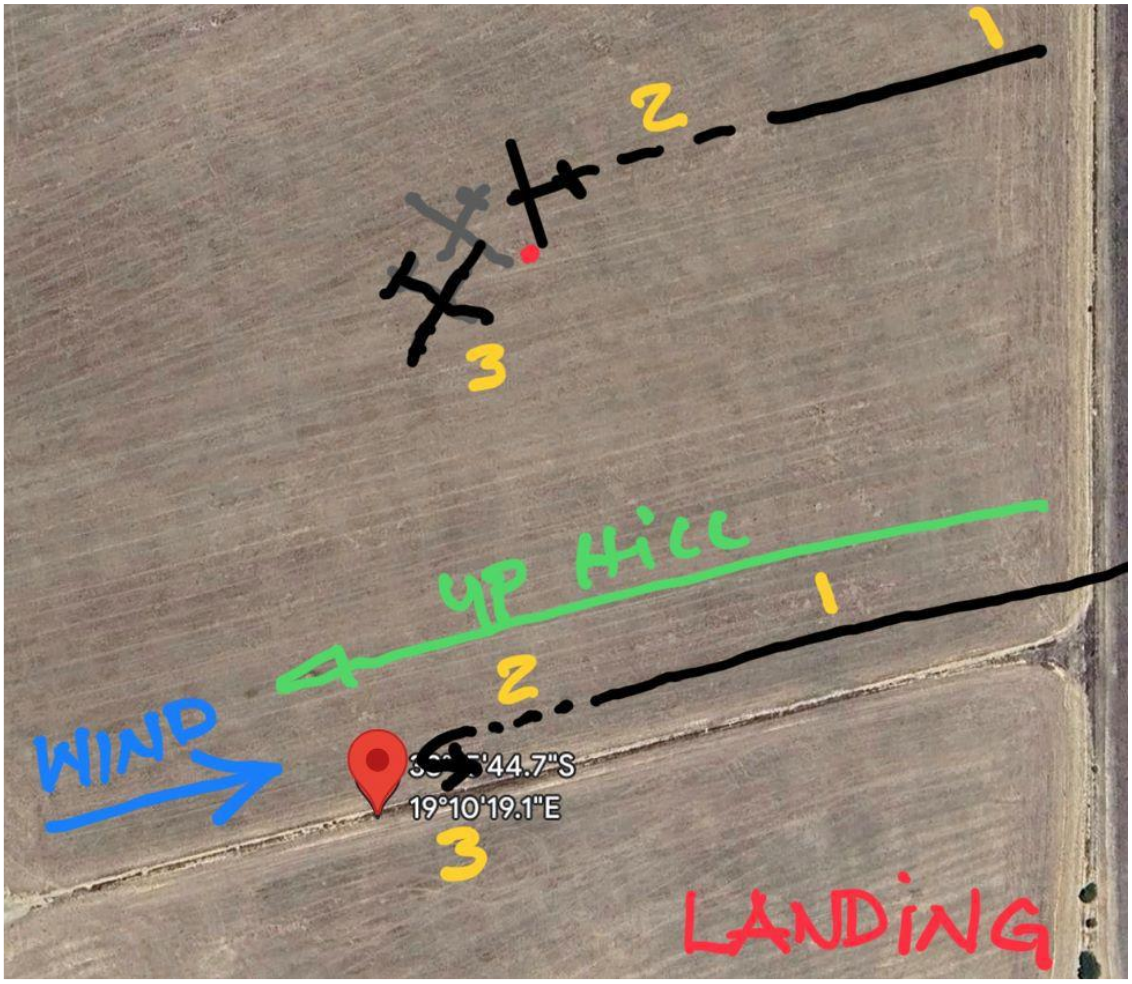

Figure 1: The red pin marks the spot where the glider rested. (Source: Pilot)

Figure 2: The glider as it came to rest. (Source: Pilot)

Figure 3: Aft view of the glider at the accident site. (Source: Pilot)

Figure 4: The damaged tail boom of the glider. (Source: Pilot)

Meteorological Information

The weather information in the table below was obtained from the pilot questionnaire form (CA 12-03).

Wind Direction	270º	Wind Speed	8 knots	Visibility	9999 m
Temperature	24ºC	Cloud Cover	7 octas	Cloud Base	4 500ft
Dew Point	Unknown	QNH	1017hPa		

Additional Information

The pilot (who was also the owner) of the glider did not report the accident to the Accident and Incident Investigations Division (AIID) as required in Part 12.02.1 and Part 12.02.2 (Notification of an Accident or an Incident) of the Civil Aviation Regulations 2011 as amended. The AIID was notified of the accident in March 2024 when one of the Regulator's airworthiness inspectors was requested to conduct an Authority to Fly (ATF) renewal inspection on the aircraft after it had undergone repairs.

Staying in the Air (Source: https://science.howstuffworks.com/transport/flight/modern/glider3.htm

The wings on a glider have to produce enough lift to balance the weight of the glider. The faster the glider goes the more lift the wings make. If the glider flies fast enough the wings will produce enough lift to keep it in the air. But, the wings and the body of the glider also produce drag, and they produce more drag the faster the glider flies. Since [there is] no engine on a glider to produce thrust, the glider has to generate speed in some other way. Angling the glider downward, trading altitude for speed, allows the glider to fly fast enough to generate the lift needed to support its weight.

The way you measure the performance of a glider is by its glide ratio. This ratio tells you how much horizontal distance a glider can travel compared to the altitude it has to drop. Modern gliders can have glide ratios better than 60:1. This means they can glide for 60 miles if they start at an altitude of one mile. For comparison, a commercial jetliner might have glide ratios somewhere around 17:1.

If the glide ratio were the only factor involved, gliders would not be able to stay in the air nearly as long as they do. So how do they do it?

The key to staying in the air for longer periods of time is to get some help from Mother Nature whenever possible. While a glider will slowly descend with respect to the air around it, what if the air around it was moving upward faster than the glider was descending? It is kind of like trying to paddle a kayak upstream; even though you may be cutting through the water at a respectable pace, you are not really making any progress with respect to the riverbank. The same thing works with gliders. If you are descending at one meter per second, but the air around the plane is rising at two meters per second, you are actually gaining altitude.

There are three main types of rising air used by glider pilots to increase flight times:

- *Thermals*
- *Ridge lift*
- *Waves*

Thermals

Thermals are columns of rising air created by the heating of the Earth's surface. As the air near the ground is heated by the sun, it expands and rises. Pilots keep an eye out for terrain that absorbs the morning sun more rapidly than surrounding areas. These areas, such as asphalt parking lots, dark [ploughed] fields and rocky terrain, are a great way to find thermal columns. Pilots also keep a look out for newly forming cumulus clouds, or even large birds soaring without flapping their wings, which can also be signs of thermal activity.

Once a thermal is located, pilots will turn back and circle within the column until they reach their desired altitude at which time they will exit and resume their flight. To prevent confusion, gliders all circle in the same direction within thermals. The first glider in the thermal gets to decide the direction -- all the other gliders that join the thermal must circle in that direction.

Ridge Lift

Ridge lift is created by winds blowing against mountains, hills or other ridges. As the air reaches the mountain, it is redirected upward and forms a band of lift along the windward side of the slope. Ridge lift typically reaches no higher than a few hundred feet higher than the terrain that creates it. What ridge lift lacks in height however, it makes up for in length; gliders have been known to fly for a thousand miles along mountain chains using mostly ridge lift and wave lift.

Wave Lift

Wave lift is similar to ridge lift in that it is created when wind meets a mountain. Wave lift, however, is created on the leeward side of the peak by winds passing over the mountain instead of up one side. Wave lift can be identified by the unique cloud formations produced. Wave lift can reach thousands of feet high, and gliders can reach altitudes of more than 35 000 feet.

Findings

1. Personnel Information

1.1 The pilot had a Glider Pilot Licence (GPL) that was initially issued by the Regulator (SACAA) on 12 September 2022 with an expiry date of 2 August 2025. The pilot had flown a total of 306.4 hours on the glider type.

1.2 The pilot was issued a Class 4 aviation medical certificate on 3 July 2023 with an expiry date of 3 July 2025.

1.3 The pilot had no medical restrictions according to his aviation medical certificate.

2. Aircraft Information

2.1 The last maintenance inspection that was conducted on the glider before the accident flight was certified on 9 October 2022 at 658.6 airframe hours. The glider had accrued 54.1 hours since the maintenance inspection.

2.2 The glider was issued a Certificate of Release to Service (CRS) on 9 October 2022 with an expiry date of 8 October 2023 or at 758.6 airframe hours, whichever occurs first.

2.3 The glider's Certificate of Registration (C of R) was issued to the present owner on 21 August 2020.

2.4 No documented evidence could be found that the glider was subjected to any maintenance inspection after the CRS lapsed on 8 October 2023.

2.5 Four flights were conducted on the glider since 8 October 2023 (including the accident flight) post the CRS validity date.

2.6 The glider was not maintained according to the provisions of Part 44.01.6 of the Civil Aviation Regulations (CAR) 2011 as amended.

44.01.6 *(1) A non-type certificated aircraft, specified in regulation 24.01.1 (1) and classified in paragraphs (a) to (g) of regulation 24.01.1 (2) shall undergo an annual inspection no later than 365 days since the previous annual inspection, or an inspection equivalent to an annual inspection, was carried out.*

2.7 Because of the above, the glider was rendered not airworthy; also, this rendered the Authority to Fly (ATF) invalid at the time of the accident flight even though it was issued on 21 May 2019 with an expiry date of 31 December 2023.

Probable Cause(s)

The glider could not sustain flight due to the absence of thermals which resulted in loss of height. The pilot conducted a field landing, and during the landing process, the left wing was caught by vegetation and the glider ground looped. The glider sustained substantial structural damage.

Contributing Factor(s)

None.

Safety Action(s)

None.

Safety Message and/or Safety Recommendation/s

None.

About this Report

The decision to conduct a limited investigation is based on factors including whether the cause is known and the evidence supporting the cause is clear, the level of safety benefit likely to be obtained from an investigation, and that will determine the scope of an investigation. For this occurrence, a limited investigation has been conducted, and the Accident and Incident Investigations Division (AIID) has relied on the information submitted by the affected person/s and organisation/s to compile this limited report. The report has been compiled using information supplied in the initial notification, as well as from follow-up desktop inquiries to bring awareness of

potential safety issues to the industry in respect of this occurrence, as well as possible safety action/s that the industry might want to consider in preventing a recurrence of a similar occurrence.

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

In terms of Regulation 12.03.1 of the Civil Aviation Regulations (CAR) 2011 and ICAO Annex 13, 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 apportion blame or liability.

Disclaimer

This report is issued by:
Accident and Incident Investigations Division
South African Civil Aviation Authority
Republic of South Africa