

**CAA Safety Investigation Report
Collision with terrain involving ZK-GZV
Alexander Schleicher GmbH & Co. ASH 31 Mi
Ben Ohau Range Otago
06 February 2016**



ZK-GZV (Image source: nzcivair.blogspot.com)

CAA Safety Investigation Report
CAA Final Report 16/437
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Executive summary

The CAA was notified on 06 February 2016 that ZK-GZV an Alexander Schleicher GmbH & Co. ASH 31 Mi, a single seat self-launching glider, was reported as missing after failing to return to Omarama Aerodrome as expected. During an extensive search by a number of aircraft, the wreckage of the glider was located late the following day on a slope comprising part of the Ben Ohau Ranges, approximately 19 nautical miles north-north-west from Omarama Aerodrome. Search and Rescue personnel were then flown to the site where they confirmed that the pilot had not survived the accident.

The Transport Accident Investigation Commission was in turn notified of the details and elected not to investigate. A CAA safety investigation on-site examination was commenced on 10 February 2016.

The CAA safety investigation found that the accident occurred as a result of the glider striking the side of a ridgeline while attempting to gain altitude in close proximity to mountainous terrain. The pilot was able to vacate the wreckage and then move some distance from the glider before succumbing to the injuries received in the accident.

There was considerable delay in locating the glider due to uncertainty as to the pilot's intended flight route, a lack of flight following information and the pilot not activating the Personal Locator Beacon (PLB) immediately following the accident.

The pilot was operating within the Civil Aviation Rule requirements and within the guidelines of the gliding club of which the pilot was a member. No CAA safety recommendations were raised as a result of this accident.

A safety action was carried out by Gliding New Zealand by amending their Advisory Circular AC2-13 *Mountain and ridge Soaring safety principles*, providing glider pilots with advice on flight following procedures.

Factual Information

On the day of the accident, the pilot who was the owner of the glider, had intended to go gliding in the local area, this was not part of any set task or competition, rather just for the purposes of building further flight experience.

Using the glider's engine, the pilot self-launched the glider from Omarama Aerodrome at 1340¹ hours. When the glider failed to return to Omarama Aerodrome as expected later that afternoon, an extensive airborne search was planned in the evening and commenced the following morning.

The glider was found by searchers later that day, approximately 27 hours after the accident had occurred. However, the pilot had not survived the accident.

After departure from Omarama Aerodrome, the last radio communication from ZK-GZV was recorded by the Omarama Base Radio system where the pilot stated that the glider was overhead the north end of the Benmore Range at 6800 feet² and tracking to the Ben Ohau

¹ All times New Zealand Daylight Time (UTC +13 hours)

² All altitudes stated in this report are feet above mean sea level

Range. This radio transmission was made approximately 30 minutes after ZK-GZV took off from Omarama Aerodrome. No further communications or sightings of the glider were made until the wreckage was located at approximately 1730 hours the following day.

ZK-GZV was fitted with an LxNav LX9000 Vario Navigation system (LX9000) from which Global Positioning System (GPS) data pertaining to the flight was able to be accessed. Using the GPS data, the CAA safety investigation was able to recreate the glider's flight path. On getting airborne from Omarama Aerodrome, the pilot tracked to the north along the Benmore Range using the available lift to gain altitude.

At the northern end of the Benmore Range, the glider had attained an altitude of 6700 feet, the pilot then set heading direct to the eastern side of the Ben Ohau Range, arriving there with an altitude of 5000 feet.

The pilot continued flying in a northerly direction along the eastern slopes of the Ben Ohau Range. It was observed from the GPS data that the available lift was not strong with the pilot having to conduct a number of turns to gain altitude to continue flying north.

In the vicinity of the accident location, the pilot had carried out approximately six turns to the left over a gully in an attempt to find suitable lift. It was observed from the GPS data that the glider was positioned in close proximity to the terrain during the turns. During the final recorded turn, the glider descended and struck the side of the gully.

Witness marks observed on the terrain and glider indicate that the left wing tip of the glider had made the initial contact with the terrain. Following the wing tip strike, the glider rolled inverted sliding down the slope for approximately 80 metres before coming to rest.

The pilot was able to undo the seat harness, vacate the cockpit and remove the parachute pack. It was noted that the harness buckle for the parachute pack was found to be in the fastened position.

The pilot's PLB was found in close proximity to the parachute pack. It appeared that the pilot had attempted to gain access to the PLB which was located in a pocket on the parachute harness and secured by a Velcro flap. However, it is apparent that the pilot had not been able to manually activate the PLB.

The pilot's body was found by search and rescue personnel 250 metres down slope from the glider, partially under a small rock outcrop.

The accident occurred at 1432 hours, 19 nautical miles north-north-west of Omarama Aerodrome, at an elevation of 4500 feet. Latitude S 44° 10' 02.6", longitude E 169° 57' 37.7".

Pilot information

The pilot, aged 55 years, held a Gliding New Zealand Qualified Pilot Certificate (QGP) and a valid Gliding New Zealand Medical Declaration and Certificate.

The pilot commenced glider flying training on 9 March 2014, and completed a first solo flight after 25 hours of instruction, 19 days after the first flight. The pilot's Qualified Glider Pilot Certificate was issued in May 2015. The pilot retained a good level of currency from commencing flying, and had accrued approximately 289 hours total glider flying time in approximately 22 months as recorded in the pilot's logbook.

The pilot's logbook also records approximately 11 hours as P2³ in an ASH 25M two seat glider receiving instruction in flying high performance gliders from an experienced gliding instructor. The pilot's first flight in ZK-GZV was carried out in October 2015, a total of 92.27 hours were flown by the pilot in the glider up until the time of the accident.

| Description | Logbook record in hours and minutes |
|--|-------------------------------------|
| Total flight hours | 289.30 |
| Flight hours in last 7 days (ZK-GZV) | 9.53 |
| Flight hours last 30 days (ZK-GZV) | 35.38 |
| Flight hours last 90 days (ZK-GZV) | 83.18 |
| Total flight hours on ASH 31 MI (ZK-GZV) | 92.27 |
| Flight hours on ASH 31 MI 18M wing span | 73.50 |
| Flight hours on ASH 31 MI 21M wing span | 18.37 |

Table 1: Pilot flight hours

On the day of the accident, the pilot was described by fellow glider pilots as being relaxed and in good spirits.

Weather conditions

On the day of the accident, a ridge of high pressure was extending over the South Island from an anticyclone centred over the Tasman Sea.

Winds below 10,000 feet were forecast to be light over the area of the accident, with areas of cumulus and strato cumulus cloud with a base of 3000 feet and tops of 7000 feet possibly developing in the afternoon.

The Pukaki Aerodrome automatic meteorological observation station, located approximately 15km south-east of the accident site, recorded winds from the east-north-east of 15-25 knots around the time of the accident, with no cloud detected. Pukaki Aerodrome is at an elevation of 1575 feet, approximately 2900 feet lower than the accident site at 4500 feet.

New Zealand Meteorological Service forecasts and specialised Regional Atmospheric Soaring Prediction data, widely used by glider pilots in New Zealand and many other countries, predicted conditions that were marginal for soaring on the day of the accident.

A review of the recorded data for the accident flight extracted from the glider's LX9000 system revealed a period of approximately 20 minutes in which ZK-GZV achieved an altitude gain to approximately 6700 feet. This period commenced from approximately 10 minutes into the flight, over the Benmore Range to the north-east of Omarama Aerodrome. No further periods of significant lift were recorded for the duration of the flight.

³ P2: Flight carried out under dual instruction

Aircraft information

The Alexander Schleicher GmbH & Co. ASH 31 Mi is a single seat sailplane constructed primarily of carbon fibre composite material. The glider is able to be configured in either 18 metre or 21 metre wing spans by the use of different length outer wing panels. The glider was in the 21 metre configuration at the time of the accident. A rotary engine is mounted in the fuselage behind the cockpit with an associated mast mounted retractable propeller making the glider capable of self-launching and self-sustaining powered flight.

ZK-GZV had been imported new into New Zealand from Germany in September 2015. A Standard Certificate of Airworthiness was issued by the CAA in October 2015. A certificate of Release to Service was also issued by a Gliding New Zealand approved representative at that time.

There was no recorded maintenance carried out on the glider between the time that it entered service up until the time of the accident. On the day of the accident the pilot had signed for completing the Daily Inspection. At the time of the accident the glider had accrued 92.5 hours total flight time.

The ASH 31 Mi has a maximum allowable all up weight of 700 kilograms when rigged in the 21 metre wingspan configuration. At the time of the accident it is estimated that the all up weight of the glider was 560 kilograms. The centre of gravity was also calculated to be within the specified limits for the glider.

Communications

ZK-GZV was fitted with a Becker AR6201 Very High Frequency (VHF) radio capable of communications with both airborne and ground VHF stations. The last communication received from ZK-GZV was a position report recorded by Omarama Base Radio approximately 30 minutes after take-off from Omarama. During that radio transmission the pilot advised that he was over the north end of the Benmore Range. No further communications were heard or recorded from the pilot.

Flight recorders

ZK-GZV was fitted with an LX9000 Navigation System. Flight data was retrieved from the unit which enabled the flight path to be recreated using suitable computer software. The data provided good indications of airspeed, height and the flight path during the flight. This data proved useful during the safety investigation.

The pilot typically carried a Spot GPS Personal Tracker unit when flying, however, on the day of the accident the pilot could not get the unit to work. The unit was found secured to the pilot's parachute harness, however, no information had been received from the unit by personnel on the ground.

The Spot Tracker would normally have provided position information from the glider at regular intervals. This information can be viewed by personnel on the ground via a web site providing a method of flight following.

Wreckage and impact information

The glider initially struck the north face of a gully with the left wing tip while in a steep turn to the left. This caused the separation of the outer wing panel with the glider continuing to roll to the left until inverted. The right wing tip then struck the ground resulting in the outer panel separating from the wing. The glider then struck the ground with the top of the forward fuselage which shattered the canopy and destroyed the instrument binnacle. The cockpit area immediately behind the pilot's head was filled with compacted soil. The glider came to rest approximately 80 metres from where the left wing tip initially struck the ground. Refer figures 1 and 2 below:



Figure 1: Accident site (Google Earth)



Figure 2: ZK-GZV Wreckage (CAA photo)

The continuity of all flying control systems were established as far as possible, however, the complete integrity of the systems could not be confirmed due to the accident damage.

The propeller and engine controls were found to be in the stowed position indicating that the pilot had not attempted to start the engine during the final stages of the flight to gain altitude.

Medical and pathological information

Post-mortem examination revealed the cause of death was due to complications of a head injury that the pilot sustained during the accident, it was determined that the head injury was not instantly fatal.

Following the accident, the pilot was able to exit the glider and move approximately 250 metres downhill to where he was later found. It was not possible to determine for how long the pilot had survived following the accident.

Results of toxicological testing detected a trace level of alcohol only. Trace levels of alcohol may be due to means other than deliberate ingestion. No other commonly screened for drugs were detected. Carbon Monoxide saturation was less than 5%⁴.

Survival aspects

The accident occurred at a relatively low airspeed of approximately 50 knots, impact forces from the collision with the terrain were initially absorbed by the wings of the glider. The pilot was restrained by a combined lap and shoulder harness, the impact forces involved during collision with the terrain proved to be survivable.

The last recorded radio call received from the pilot was a position report transmitted approximately 30 minutes after take-off. The contents of the position report gave the current position, height and the pilot's intentions of tracking west to the Ben Ohau Range. Initially the search co-ordinators weren't aware of the recorded radio call as the recording of radio communications had only recently been introduced at Omarama Aerodrome. Once the search co-ordinators were aware of the position report from ZK-GZV, they were able to concentrate their search efforts to the north of Omarama where ZK-GZV was located at approximately 1730 hours on the day after the accident.

The glider was not fitted with an Emergency Locator Beacon, nor was it required to be under the current Civil Aviation Rules. However, the pilot carried a PLB contained in a pouch on the parachute harness. The PLB was found removed from the pouch but it had not been activated by the pilot.

Analysis

Concern as to the whereabouts of ZK-GZV began to mount during the afternoon of the accident when it was realised that the glider had not returned to Omarama Aerodrome. A co-ordinated search was planned at Omarama Aerodrome that evening, however, nothing could be done until first light the next day. The search for ZK-GZV was hindered by the fact that no-one was aware of the route that the pilot had intended to fly.

⁴ Blood carbon monoxide saturations of less than 10% are consistent with normal levels observed in the general population.

The pilot's Spot Tracker was unserviceable which meant that flight following information was not available to the search team.

The safety investigation determined that the accident occurred as a result of the glider striking the side of a gully in a steep turn to the left while the pilot was orbiting in a blind valley. GPS data obtained from the glider's LX9000 system depicted a series of left turns as the pilot attempted to utilise rising air (lift) to gain height.

During the final turn prior to striking terrain, the pilot had failed to maintain sufficient lateral clearance from the side of the gully. The GPS data recorded shows a loss of altitude while the glider was in the turn which was most likely a result of the glider encountering sinking air. The left wing tip then struck the ground resulting in a subsequent loss of control of the glider.

It is possible that the pilot's decision making prior to the accident was influenced by a human factor known as Plan Continuation Bias⁵. Unwittingly, the pilot got into a hazardous situation by attempting to seek rising air in a blind valley and in close proximity to the terrain. The pilot may have become fixated by the challenge of finding rising air in the difficult thermal conditions, attempting to use the weak available lift rather than choosing the more suitable option of turning to the east away from the rising terrain. If no further lift was then encountered, the options of either starting the engine or making a landing at Pukaki Aerodrome, which would have been within gliding range, were available.

In making the turns to the left, the pilot was continually flying towards the side of the gully at a perpendicular angle. By doing so, little safety margin was available for taking corrective actions if sinking air was encountered, which would result in the glider descending in close proximity to the terrain.

Gliding New Zealand Advisory Circular AC2-13 *Mountain & Ridge Soaring Safety Principles* is available on the Gliding New Zealand web site at <http://gliding.co.nz/wp-content/uploads/2016/08/AC-2-13-v2.pdf> Contained in the advisory circular is advice on circling near a hill which states: *'It is vitally important when considering circling near a hill that you consider the risk of sudden loss of height if sink is encountered. Many mountain flying accidents have occurred due to insufficient margin when circling near the hill. Both horizontal and vertical separation needs to be considered along with drift due to wind. Figure of eights should be used if you have any doubt turning away from the hill'.*

Advisory Circular AC2-13 also makes reference to a document titled '*Safety in Mountain Flying*' which is also available on the Gliding New Zealand web site for glider pilots. This article provides advice on glider operations in close proximity to ridge lines. The article can be accessed at <http://gliding.co.nz/wp-content/uploads/2014/01/Safety-in-Mountain-Flying-CNIV.pdf>

⁵ Plan Continuation Bias: The unconscious cognitive bias to continue with the original plan in spite of changing conditions.

Conclusions

The accident probably occurred as a result of an error in judgement by the pilot while conducting a series of steep turns in an attempt to gain altitude in close proximity to the terrain.

The pilot had continued to attempt to find lift in the close confines of the terrain. A better course of action would have been to fly away from the rising terrain and start the engine if required.

Following the wing tip striking the terrain, the pilot lost control of the glider which then struck the side of the gully in an inverted attitude.

The accident was initially survivable due to the low impact forces involved, however, the pilot passed away prior to being found by search and rescue personnel.

The pilot did not activate the PLB, most likely due to a state of confusion resulting from the head injury received in the accident.

Due to a lack of information regarding the pilot's intentions for the flight and the lack of a functioning Spot Tracker, a significant delay ensued before the accident site was located.

The glider pilot was appropriately licensed and fit to carry out the flight.

Safety Action

To provide glider pilots with advice on flight following, Gliding New Zealand amended Advisory Circular AC2-13 *Mountain and ridge Soaring safety principles* in September 2017 with the following information:

'For flight following purposes, pilots should make their general intentions known by chatting to other pilots in the vicinity and/or by regular position reports to club base if possible. Use of a GPS flight tracking device (such as a SPOT messenger) is highly recommended, particularly if the area to be flown is likely to be outside VHF radio coverage.'

Club Standard Operating Procedures (SoPs) should cover the need to actively log all position reports received.'

Safety Message

When operating in close proximity to high or mountainous terrain, it is vitally important that sufficient distance from the terrain is maintained to allow for any sudden height loss due to unexpected changing environmental conditions. Glider pilots need to be aware of not falling into the trap of continued flight close to terrain while leaving themselves with no other options for a safe flight path away from the terrain. Information is available on the Gliding New Zealand web site in the form of Advisory Circular AC2-13 *Mountain & Ridge Soaring Safety Principles* and also *Safety in Mountain Flying* provides guidance when conducting mountain flying operations.

All pilots carrying out cross country flights should ensure to the best of their ability, that their position is known by another person or agency on a regular basis.

This can be achieved in a number of ways including: the use of a GPS Tracker, maintaining communications with other pilots in the area, regular radio calls which are acknowledged by local flight following or Air Traffic Control, or by any other means at their disposal. In the unlikely event of the glider going overdue or missing, information provided by the pilot during the flight will likely assist in location of the glider.

It should also be noted that the Gliding New Zealand Manual of Approved Procedures, paragraph 10.6 on page 60, states the following: 'For flight following purposes, pilots are to make regular position reports either to the club base or to other airborne gliders if possible. Use of a GPS flight tracking device (such as a SPOT messenger) is highly recommended, particularly if the area to be flown is likely to be outside VHF radio coverage.'

About the CAA

New Zealand's legislative mandate to investigate an accident or incident are prescribed in the Transport Accident Investigation Commission Act 1990 (the TAIC Act) and Civil Aviation Act 1990 (the CAA Act).

Following notification of an accident or incident, TAIC may conduct an investigation. CAA may also investigate subject to Section 72B(2)(d) of the CAA Act which prescribes the following:

72B Functions of Authority

(2) The Authority has the following functions:

- (d) To investigate and review civil aviation accidents and incidents in its capacity as the responsible safety and security authority, subject to the limitations set out in section [14\(3\)](#) of the [Transport Accident Investigation Commission Act 1990](#)

The purpose of a CAA safety investigation is to determine the circumstances and identify contributory factors of an accident or incident with the purpose of minimising or reducing the risk to an acceptable level of a similar occurrence arising in the future. The safety investigation does not seek to ascribe responsibility to any person but to establish the contributory factors of the accident or incident based on the balance of probability.

A CAA safety investigation seeks to provide the Director of the CAA with the information required to assess which, if any, risk-based regulatory intervention tools may be required to attain CAA safety objectives.

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