

**AIRCRAFT ACCIDENT REPORT**  
**CAA OCCURRENCE NUMBER 09/4873**  
**SCHEMPP-HIRTH MINI-NIMBUS HS7**  
**ZK-GLN**  
**IMPACT WITH TERRAIN**  
**14 KM SOUTH OF BLENHEIM**  
**18 DECEMBER 2009**



## Foreword

As a signatory to the Convention on International Civil Aviation 1944 (the Chicago Convention) New Zealand has international obligations in respect of the investigation of accidents and incidents. Pursuant to Articles 26 and 37 of the Chicago Convention, the International Civil Aviation Organisation (ICAO) issued Annex 13 to the Convention setting out International Standards and Recommended Practices in respect of the investigation of aircraft accidents and incidents.

New Zealand's international obligations are reflected in the Civil Aviation Act 1990 (the Act) and the Transport Accident Investigation Commission Act 1990 (the TAIC Act).

Section 72B (2)(d) and (e) of the Civil Aviation Act 1990 Act also provides:

### **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](#):
- (e) To notify the Transport Accident Investigation Commission in accordance with section [27](#) of this Act of accidents and incidents notified to the Authority:

Following notification to the Transport Accident Investigation Commission (the Commission) of any accident or incident which is notified to the Authority, an investigation may be conducted by the Commission in accordance with the TAIC Act. CAA may also investigate subject to the requirements of the TAIC Act.

The purpose of an investigation by the Commission is to determine the circumstances and causes of accidents and incidents with a view to avoiding similar occurrences in the future, rather than to ascribe blame to any person.

CAA however investigates aviation accidents and incidents for a range of purposes under the Act. Investigations are primarily conducted for the purpose of preventing future accidents by determining the contributing factors or causes and then implementing appropriate preventive measures - in other words to restore safety margins to provide an acceptable level of risk. The focus of CAA safety investigations is therefore to establish the causes of the accident on the balance of probability.

Accident investigations do not always identify one dominant or 'proximate' cause. Often, an aviation accident is the last event in a chain of several events or factors, each of which may contribute to a greater or lesser degree, to the final outcome.

CAA investigations may also inform other regulatory-safety decision making or enforcement action by the Director.

In the case of a fatal aviation accident, the final CAA investigation report will generally be highly relevant to an inquiry, and in some circumstances, an inquest, conducted by a Coroner.

CAA investigations are not however done for, or on behalf of a Coroner.

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## Glossary of abbreviations:

amsl	above mean sea level
ARA	Annual Review of Airworthiness
ARFOR	area forecast
CAA	Civil Aviation Authority
CAR	Civil Aviation Rule(s)
FAI	Fédération Aéronautique Internationale
FIS	Flight Information Service
ft	foot or feet
GPS	Global Positioning System
kg(s)	kilogram(s)
km(s)	kilometre(s)
m(s)	metre(s)
MetService	Meteorological Service of New Zealand Ltd
MHz	megahertz
mm(s)	millimetre(s)
NZDT	New Zealand Daylight Time
PLB	Personal Locator Beacon
RCCNZ	Rescue Coordination Centre New Zealand
SIGMET	significant meteorological information
SSR	Secondary Surveillance Radar
TAF	aerodrome forecast
UHF	Ultra High Frequency
UTC	Coordinated Universal Time
UV	ultraviolet
VHF	Very High Frequency

## Data summary

<b>Aircraft type, serial number and registration:</b>	Schempp-Hirth Mini-Nimbus-HS7, S/N 24, ZK-GLN
<b>Number and type of engines:</b>	Not applicable
<b>Year of manufacture:</b>	1977
<b>Date and time:</b>	18 December 2009, 0859 NZDT <sup>1</sup>
<b>Location:</b>	14 km south-southwest of Blenheim near Orchard Spur Latitude <sup>2</sup> : S 41° 37' 2.3" Longitude: E 173° 52' 27"
<b>Type of flight:</b>	Private
<b>Persons on board:</b>	Crew: 1
<b>Injuries:</b>	Crew: 1 Fatal
<b>Nature of damage:</b>	Aircraft destroyed
<b>Pilot's licence:</b>	Qualified Glider Pilot Certificate and Category 'A' Gliding Instructor Rating
<b>Pilot's age:</b>	55 years
<b>Pilot's total flying experience:</b>	1983.68 hours 768.5 on type
<b>Information sources:</b>	Civil Aviation Authority field investigation
<b>Investigator in Charge:</b>	Mr D G Foley

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<sup>1</sup>The 24 hour clock is used in this report to describe the local time of day, New Zealand Daylight Time (NZDT), at which particular events occurred. NZDT is Coordinate Universal Time (UTC) plus 13 hours.

<sup>2</sup> WGS 84 co-ordinates.

## Synopsis

At 0825 hours on 18 December 2009 a Mini Nimbus HS7 Glider registered ZK-GLN departed Omaka Aerodrome, Blenheim on an aero-tow<sup>3</sup> to commence a long distance cross-country flight. The pilot was the sole occupant of the glider. After successfully releasing from the aero-tow, the pilot appeared to carry out a series of manoeuvres along ridge lines south of the aerodrome in an apparent attempt to gain height. The glider collided with a spur, approximately 14 km south of Blenheim at approximately 0859 hours. The glider was destroyed and the pilot was fatally injured.

The Civil Aviation Authority (CAA) was notified of the accident in the early hours of Saturday morning 19 December 2009. The Transport Accident Investigation Commission was notified shortly after, but declined to investigate. A CAA field investigation was commenced that day.

### 1. Factual information

#### 1.1 History of the flight

- 1.1.1 On the day of the accident the pilot was attempting to achieve a non-stop cross-country flight of at least 1000 kms in order to qualify for a FAI<sup>4</sup> 1000 km Badge and Diploma. The intended flight would have taken the pilot from Omaka Aerodrome near Blenheim to the central area of the South Island near Lake Coleridge, back to Seddon just south of Blenheim, south to Tarras in Central Otago and then returning to Omaka Aerodrome. It was estimated that the round trip would take around 12 hours to complete. The pilot had made eleven previous attempts at this flight, but each time the flight conditions had prevented him from completing it.
- 1.1.2 The glider was prepared for the flight the evening before by the pilot and some of his friends. Later that evening the pilot was observed by his family checking weather information and doing the last of his flight planning. The next morning the pilot arrived at the aerodrome around 0615 hours and finished the final flight preparation of the glider. This included adding full water ballast to the glider. The glider was then positioned on the grass runway and connected to the tow aircraft.
- 1.1.3 No flight following service had been arranged for the flight, nor was it required under Civil Aviation Rules (CAR). The pilot had intended to make contact with the Christchurch Flight Information Service (FIS) Centre during the flight.

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<sup>3</sup> During an aero-tow a powered aircraft is attached to the glider with a tow rope.

<sup>4</sup> FAI (Fédération Aéronautique Internationale) is the world governing body for air sports and aeronautical world records.

- 1.1.4 The aero-tow launch commenced at 0825 hours and went according to plan. The glider was released at 0832 hours at approximately 3000 ft amsl around 6 kms south of Omaka Aerodrome. The Airways'<sup>5</sup> secondary surveillance radar plot information and track recording data acquired from the glider's Volkslogger recorder, shows that after the release from the aero-tow the glider manoeuvred in the area for approximately 9 minutes. During this time it descended around 1000 ft from the height that the glider was released at.
- 1.1.5 The glider then headed in a south-westerly direction for the next two minutes directly towards the valley system leading up to Orchard Spur, during which it descended to approximately 1700 ft amsl.
- 1.1.6 The glider then proceeded to ridge soar<sup>6</sup>, for the next 16 minutes, and make a series of turns while heading up the valley towards Orchard Spur. A small gain in height of around 300 ft was achieved by the glider, however the height of the terrain was also increasing up the valley. The last height and position recording for the glider indicated that the glider was flying approximately 400 ft above terrain, and approximately 300 ft above the ridge where the accident occurred, in the upper valley region near Orchard Spur.
- 1.1.7 Later in the day (at approximately 1600 hours) the aero-tow pilot called Woodbourne Air Traffic Control Tower to inquire about the progress of the glider. The Air Traffic Controller advised that the last transponder transmission for the glider was near Orchard Spur at approximately 0859 hours. The aero-tow pilot then asked the Air Traffic Controller if they would call the Christchurch FIS Centre and enquire as to the location of the glider. Christchurch FIS Centre advised that they had not received any information from or about the glider. A follow-up telephone call was made by the aero-tow pilot to Christchurch FIS Centre, during which time the aero-tow pilot raised concern about the location of the glider.
- 1.1.8 At approximately 1800 hours, the aero-tow pilot called the Rescue Coordination Centre New Zealand (RCCNZ) and advised them of the missing glider. A search using helicopters equipped with night-vision and heat seeking equipment was initiated and the glider was located in the early hours of the morning the following day on a steep slope in the Orchard Spur region. The first rescue personnel at the scene confirmed that the pilot was deceased.
- 1.1.9 The glider had struck the western side of a spur in a near vertical nose-down attitude. The accident had occurred in daylight at approximately 0859 hours, 14 km south-southwest of Blenheim in an area known as Orchard Spur, at an elevation of approximately 1800 ft amsl. Latitude S 41° 37' 2.3", longitude E 173° 52' 27".

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5 Airways Corporation of New Zealand.

6 Ridge soaring involves seeking lift where the wind blows against the face of a hill/mountain slope and is forced to rise.

## 1.2 Injuries to persons

<i>Injuries</i>	<i>Crew</i>	<i>Passengers</i>	<i>Other</i>
Fatal	1	0	0
Serious	0	0	0
Minor/None	0	0	

## 1.3 Damage to aircraft

1.3.1 The aircraft was destroyed.

## 1.4 Other damage

1.4.1 Nil.

## 1.5 Personnel information

1.5.1 The pilot, aged 55 years, held a Qualified Glider Pilot Certificate and a Category 'A' Gliding Instructor Rating. He also held an FAI Gliding Certificate and Silver Badge. At the time of the accident he had a total of 1983.68 hours gliding experience involving 2646 flights. He had flown 768.5 hours in ZK-GLN.

1.5.2 The pilot held the executive position of National Operations Officer within the Gliding New Zealand organisation and was a senior member at his local gliding club at Omake.

## 1.6 Aircraft information

1.6.1 The Mini Nimbus HS7 glider registered ZK-GLN, serial number 24, was constructed in West Germany in 1977 and exported to New Zealand. It was first registered in New Zealand as ZK-GLN in 1978, and issued with a non-terminating Certificate of Airworthiness in the Standard Category.

1.6.2 The Mini-Nimbus HS7 is a single-seat, 15 metre wingspan sailplane constructed from fibre-glass. The glider has superior climbing performance<sup>7</sup> when compared to other similar gliders. The glider design also has a unique trailing-edge integrated air brake/flap system which gives the glider short field and steep landing approach capability.

1.6.3 Post-accident calculations established that the glider's weight and the centre of gravity were within prescribed limits.

1.6.4 The last recorded scheduled maintenance performed on ZK-GLN was completed on 1 September 2009. This involved an annual inspection and was carried out

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<sup>7</sup> The altitude gained over time while climbing in lifting air.



concurrently with the Annual Review of Airworthiness inspection and compass swing. The glider was released to service following the inspection.

## **1.7 Meteorological information**

- 1.7.1 On the day of the accident a ridge of high pressure extended from an anticyclone northwest of the North Island to just north of the Chatham Islands. A frontal system was moving northeast onto the south of the South Island. Between these two systems a very strong but stable northwest airstream covered southern and central New Zealand.
- 1.7.2 The pilot's pre-flight planning began on the evening before the accident. However, the safety investigation could not confirm what meteorological information was obtained by the pilot, that evening or the following morning.
- 1.7.3 At the time of the accident, aviation meteorological information was available to recreational pilots free of charge, in the form of actual conditions and forecast conditions.
- 1.7.4 The Straits Area forecast (ARFOR ST<sup>8</sup>) issued at 0522 hours, forecast occasional moderate turbulence and or downdrafts about and east of the ranges, and that it may become severe and a SIGMET may be issued.
- 1.7.5 SIGMET<sup>9</sup> 171939 which was issued at 0839 hours, forecast severe turbulence below flight level 120<sup>10</sup> about and east of the ranges south of Woodbourne.
- 1.7.6 The Woodbourne Aerodrome forecast (TAF NZWB) which was issued at 0322 hours, forecast the surface wind to be 300 degrees at 10 kts. The wind at 2000 ft was forecast to be 300 degrees at 20 kts. However, the same forecast also indicated a change between 0900 and 1100 hours of the surface wind to 320 degrees at 20 gusting 30 kts and the wind at 2000 ft to 300 degrees at 30 kts.
- 1.7.7 A report from the Meteorological Service of New Zealand Limited (MetService) on the weather conditions in the vicinity of Blenheim at 0800 hours indicated that the 'wind at 1000 ft was probably from 330 degrees at 20 to 25 kts, and steadily changing to about 280 degrees at 30 kts at 10,000 ft. The wind strength increased during the morning and was 25 to 30 kts at 1000 ft and 35 kts at 10,000 ft, between about 1000 hours and 1600 hours, and decreased after that time.'
- 1.7.8 The MetService analysis for the weather conditions near Orchard Spur at the time of the accident indicates that 'the wind below 3000 ft was 20 to 30 kts from the

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<sup>8</sup> Area forecasts are forecasts for a specific region, this was issued at 0522 hours, and was for the Straits Area which included the accident location.

<sup>9</sup> SIGMETs provide information on observed or forecast hazardous weather conditions.

<sup>10</sup> A Flight Level is a standard nominal altitude of an aircraft, in hundreds of feet. This altitude is calculated from the International standard pressure datum of 1013.25 hPa.

north-northwest, and 25 to 30 kts from the west-northwest up to 10,000 ft. There were most likely rapid and large fluctuations in the wind speed and direction' (including vertical wind currents) due to the turbulent conditions. 'The turbulence at lower levels would have been produced by the surrounding terrain and at higher levels by breaking mountain waves forming on the Richmond and other ranges up wind'. The MetService report also stated that 'the turbulence experienced by an aircraft of the mass and size of the glider is likely to have been moderate to severe'.

- 1.7.9 A farmer working in the area of Orchard Spur at the time of the accident commented that the wind was very strong and variable near the peaks of the hills.

## **1.8 Aids to navigation**

- 1.8.1 The pilot was carrying a handheld Garmin GPS (a 12-channel unit).
- 1.8.2 The glider was equipped with a SSR Radar Transponder with altitude reporting capability (Mode C).

## **1.9 Communications**

- 1.9.1 The glider was equipped with a Tait 172A miniphone VHF transceiver.
- 1.9.2 The pilot was also carrying a hand-held VHF/UHF transceiver, a Vertex Standard VXA-220.
- 1.9.3 No communication was heard from the pilot after the glider's release from the tow aircraft.

## **1.10 Aerodrome information**

- 1.10.1 Not applicable.

## **1.11 Flight recorders**

- 1.11.1 The glider's flight path information was downloaded from the pilot's Garmin GPS unit and the glider's onboard data recording device (Volkslogger). The data from the recorders provided history of the flight, excluding the final seconds. The recorded flight information included both position and height data.

## **1.12 Wreckage and impact information**

- 1.12.1 The accident occurred on a steep spur situated at approximately right angles to the ridgeline in an area known as Orchard Spur. The glider had impacted the downward sloping ground on the back of the spur, on a heading of 252 degrees. Ground impact marks, and the damage to the glider, indicated that the glider had initially struck the ground at a steep nose-down attitude with the wings level.
- 1.12.2 Impact forces had crushed the cockpit and caused the horizontal tailplane locking mechanism to fail which in turn allowed the entire tailplane to separate from the vertical fin. The tail section of the glider then broke away from the glider just behind the cockpit. The glider wreckage (minus the horizontal tailplane) then

continued down the slope while the cockpit turned over in the process. The forward sections of both wings had disintegrated as a result of hydraulic effect<sup>11</sup> caused by the water ballast in the wings.

- 1.12.3 Despite the cockpit being considerably disrupted, all parts of the glider were accounted for at the accident site. Although the flight controls were severely damaged during the impact sequence, all damage to them was ascertained to be impact related, and control integrity was established as far as possible.
- 1.12.4 Aside from the successful retrieval of the GPS unit and Volkslogger data recorder, no other instrumentation was in a condition which could provide useful information to the investigation.
- 1.12.5 The hand-grip from the control stick was found down the slope approximately 20 metres from the main wreckage, along with other small pieces from the glider.

### **1.13 Medical and pathological information**

- 1.13.1 Post-mortem examination showed that the pilot died as a result of injuries received in the accident.
- 1.13.2 Toxicological tests showed no evidence of medicinal or recreational drugs, or any abnormal alcohol levels in the blood.
- 1.13.3 A review of the pilot's medical history revealed that he had suffered for a few years from an irregular heart rhythm condition. In the year preceding the accident the pilot had reported and been medically examined for breathlessness, feeling faint and heart palpitations during physical exertion. Following a second series of medical tests completed in August 2009, the Cardiologist recommended a 'watch and see approach, and if the pilot's condition worsened, then heart valve replacement surgery would be considered'.
- 1.13.4 The pilot had a current medical practitioner's medical certificate and declaration to fly a glider. The certificate was annotated by the Doctor with a statement declaring that it was 'only for solo flying'<sup>12</sup>.
- 1.13.5 A post-accident cardiology report commented that the possibility existed that the pilot 'may have had a physically disabling cardiac rhythm disturbance immediately preceding the accident, however the possibility of this was considered small'.

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<sup>11</sup>Hydraulic effect is a surge in pressure, resulting when a fluid in motion is forced to stop or change direction suddenly.

<sup>12</sup> It is assumed that this limitation was to mitigate risk to any glider passengers flying with the pilot, however it would have been acceptable for the pilot to fly with other qualified glider pilots provided the glider had dual controls.

## **1.14 Fire**

1.14.1 Fire did not occur.

## **1.15 Survival aspects**

1.15.1 The accident was not survivable due to the high-energy impact forces involved. Although the pilot was restrained by a combination lap and shoulder harness, any significant longitudinal impact in this type of aircraft usually results in the destruction of the cockpit area with consequential effects on the pilot.

1.15.2 An Accusat MT 410G Personal Locator Beacon (PLB) was located in the glider wreckage. The PLB showed no sign of an attempted, or actual, activation.

## **1.16 Tests and research**

1.16.1 Nil.

## **1.17 Organisational and management information**

1.17.1 Not applicable.

## **1.18 Additional information**

1.18.1 Not applicable.

## **1.19 Useful or effective investigation techniques**

1.19.1 Not applicable.

## **2. Analysis**

2.1 Analysis of the Volkslogger data and the Airway's secondary surveillance radar plots showed that the glider was not achieving any significant altitude gains while operating in the region of Orchard Spur. It is most likely that the pilot had been attempting to gain altitude in this area, to enable the glider to proceed through a passage on the opposite side of the valley, and then continue with the cross-country flight.

2.2 The pilot's decision to continue the flight towards higher terrain despite not gaining any significant altitude was likely influenced by the following factors:

- This was the pilot's twelfth attempt to qualify for a FAI 1000 km Badge and Diploma. It takes a reasonable investment in time, resources and effort to organise a long distance flight, and it was the very early stages of the flight which was expected to take around 12 hours to complete.
- The pilot most likely anticipated the soaring conditions to be favourable and that there would be plenty of ridge and mountain wave lift to be found locally and in other regions throughout the day.

- The pilot was the Gliding New Zealand National Operations Officer and a senior member of the local gliding club. There was some prestige and anticipated respect amongst his peers with achieving the FAI 1000 km Badge and Diploma.
  - The pilot was relatively experienced with ridge soaring close to terrain and skilled in finding lift in mountainous areas. (Note – Civil Aviation Rules [CAR 104.59] state that the pilot of a glider may operate the glider below a height of 500 ft above the surface for ridge soaring, if the flight does not create a hazard to a person or property on the ground).
- 2.3 While operating in the Orchard Spur area the glider most likely experienced significant turbulence and possible downdraughts. The MetService suggested that ‘the turbulence experienced by an aircraft of the mass and size of the glider is likely to have been moderate to severe’.
- 2.4 At 0839 hours a SIGMET was issued, forecasting severe turbulence below flight level 120 about and east of the ranges south of Woodbourne.
- 2.5 The Orchard Spur area is well known to the local glider pilots for being challenging in windy conditions because of the wave effects set up by the surrounding mountain ranges. In 1998 another glider pilot was fatally injured in an accident<sup>13</sup> a short distance further up the valley. This accident was attributed to the pilot stalling the glider in turbulent conditions.
- 2.6 A post-accident cardiology report commented on the possibility of the pilot suffering a physically disabling heart rhythm disturbance prior to the accident. Heart rhythm disturbances have the potential to lead to incapacitation with differing severity, nature, and duration. Accordingly medical incapacitation is a possible contributing factor for this accident.
- 2.7 The safety investigation could not determine whether a medical event or the significant turbulent conditions and possible downdraft, caused the pilot to lose control of the glider and subsequently impact terrain.
- 2.8 Locating the missing glider could have been achieved more expediently had the pilot arranged an effective flight following system before the flight. If the pilot had been seriously injured and in need of urgent medical treatment, this could have been a significant survival issue. Although there is no rule requiring glider pilots to arrange flight following for cross country flights, it is considered that it would be a prudent safety measure. The CAA has raised a safety action (No. 12A762) recommending that the CAA and Gliding New Zealand review whether safety guidelines and training is adequate in regard to encouraging glider pilots to actively arrange flight following for remote and long distance flights.

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<sup>13</sup> The glider involved was a Slingsby T-51 dart registered ZK-GDV (CAA aircraft accident report occurrence number 98/2908).

- 2.9 An observation was made during the safety investigation that the pilot's control stick hand-grip was found to have a crack running up its side originating from the base of the grip. This split appears to have occurred sometime before the accident; and as such the security of the hand grip was questioned. Comments from the co-owner stipulated that 'you could actually turn it a little on the stick but it took quite a bit of force to do so and it never looked like coming off during the time that I flew the glider'. The safety investigation concluded that it is most likely that the control stick hand-grip came off as a result of the severe forces during the impact sequence. However, a safety action (No. 11A1151) has been raised for the CAA to take appropriate action to ensure that all glider hand-grips are securely attached to the control sticks.

### **3. Conclusions**

- 3.1 The pilot was appropriately qualified and experienced for the flight.
- 3.2 The glider was in an airworthy condition prior to the accident and there was no evidence to suggest that mechanical failure contributed to the accident.
- 3.3 The pilot continued the flight towards higher terrain despite not gaining any significant altitude.
- 3.4 While operating in the Orchard Spur area the glider most likely experienced significant turbulence and probable downdraughts.
- 3.5 The pilot had a known medical condition which could have led to pilot incapacitation.
- 3.6 The safety investigation could not determine whether a medical event or the significant turbulent conditions, caused the pilot to lose control of the glider.
- 3.7 The glider's impact with the ground was not survivable.
- 3.8 There was considerable delay in rescue services becoming aware of the accident, and subsequently locating the missing glider.

#### **4. Safety actions**

- 4.1 Safety action (No. 11A1151) has been raised for the CAA to take appropriate action to ensure that the hand-grips for all glider control sticks are securely attached.
- 4.2 Safety action (No. 12A762) has been raised recommending that the CAA and Gliding New Zealand review whether safety guidelines and training is adequate in regard to glider pilots being encouraged to actively arrange effective flight following for remote and long distant flights.

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Date

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