

SAFETY INVESTIGATION REPORT
CAA OCCURRENCE 17/7177
PIPISTREL TAURUS ELECTRO G2
ZK-GEL
BATTERY FIRE AND SUBSEQUENT IN-FLIGHT BREAK-UP
KAIKOHE, NORTHLAND
16 NOVEMBER 2017



Foreword

New Zealand's legislative mandate to investigate an accident or incident is prescribed in the Transport Accident Investigation Commission Act 1990 (the TAIC Act) and Civil Aviation Act 1990 (the CA 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 CA 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 Civil Aviation 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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Glossary of abbreviations

AAIB	Air Accidents Investigation Branch
CAA	Civil Aviation Authority
ft	foot or feet
GRS	Galaxy rescue system (ballistic parachute)
km	kilometre(s)
kt	knot(s)
m	metre(s)
NM	Nautical miles
NZDT	New Zealand daylight time
RCCNZ	Rescue Coordination Centre New Zealand
TAF	Terminal aerodrome forecast

Data summary

Aircraft type, serial number and registration:	Pipistrel Taurus Electro G2, s/n 146 T ET, ZK-GEL
Number and type of engines:	One, Electro 40/30 (electric motor)
Year of manufacture:	2015
Date and time of accident:	16 November 2017 ¹ , unknown
Location:	North-west of Kaikohe aerodrome, Far North District Latitude ² : S 35° 26' 47.16" Longitude: E 173° 48' 6.36"
Type of flight:	Private
Persons on board:	Crew: 1
Injuries:	Crew: 1 fatal
Nature of damage:	Glider destroyed
Pilot-in-command's licence:	Qualified Glider Pilot Certificate Private Pilot Licence (Helicopter)
Pilot-in-command's age:	72 years
Pilot-in-command's total flying experience:	Approx. 592 hours (Glider)
Information sources:	Civil Aviation Authority field investigation
Investigator in charge:	Mr D Foley

¹ The 24-hour clock is used in this report to describe the local time of day, New Zealand daylight time (NZDT) is Coordinated Universal time (UTC) plus 13 hours.

² World Geodetic System 1984 (WGS-84) coordinates

Executive summary

A Pipistrel Taurus Electro G2 Glider Class 2 microlight, registration ZK-GEL, was being operated on a solo private gliding flight. The flight took place in the vicinity of Kaikohe aerodrome on 16 November 2017.

At some time between 1415 and 1730 hours, the glider, while soaring, experienced an in-flight battery thermal event. During the ensuing emergency descent and approach to Kaikohe aerodrome, the glider exceeded its speed limitations which led to a structural failure of the wings and subsequent in-flight break-up. The glider was destroyed, and the pilot was fatally injured.

The Rescue Coordination Centre New Zealand (RCCNZ) notified the Civil Aviation Authority (CAA) of the accident at 1919 hours on 16 November 2017. A CAA field investigation was commenced the following day.

As a result of this safety investigation the CAA has issued five safety actions.

1. Factual information

1.1 History of the flight

- 1.1.1 On Thursday 16 November 2017, the pilot, who was a member of the local gliding club, prepared his glider ZK-GEL, for a local flight departing from Kaikohe aerodrome.
- 1.1.2 At approximately 1340 hours, the pilot was observed positioning the glider to conduct a self-launching take-off from Runway 13.
- 1.1.3 Shortly after 1410 hours, the pilot made the radio call “rolling on one three” and departed Kaikohe aerodrome. This was the last radio transmission heard from the pilot of ZK-GEL.
- 1.1.4 At approximately 1425 hours, another local gliding club member, who had been gliding in the vicinity of Kaikohe aerodrome, landed and by 1630 hours had returned their glider to the gliding club’s hangar.
- 1.1.5 Around 1730 hours, ZK-GEL was noted as overdue. Club members tried to contact the pilot unsuccessfully on the radio. At this point the club members reported the overdue glider to the RCCNZ. Later that evening, first responders found the glider wreckage and the pilot with fatal injuries.
- 1.1.6 The accident occurred in daylight, sometime between 1415 hours and 1730 hours, approximately 0.8 NM west of Kaikohe aerodrome. Latitude S 35° 26’ 47.16”, longitude E 173° 48’ 6.36”.

1.2 Injuries to persons

<i>Injuries</i>	<i>Crew</i>	<i>Passengers</i>	<i>Other</i>
Fatal	1	0	0

Table 1: Injuries to persons

1.3 Damage to aircraft

1.3.1 The glider was destroyed.

1.4 Other damage

1.4.1 Nil.

1.5 Personnel information

Flying hours	All gliders	Taurus Electro G2
Last 24 hours	Unknown	Unknown
Last 7 days	1.6	1.6
Last 30 days	3.2	3.2
Last 90 days	8.6	8.6
Total hours	Approx. 592	87.9

Table 2: Pilot flight hours

1.5.1 The pilot held a qualified glider pilot certificate issued on 08 July 2008. At the time of the accident he had accrued over 590 hours of gliding experience. He had flown 87.9 hours in ZK-GEL.

1.5.2 The pilot conducted a biennial flight review on 01 June 2017, which allowed him to exercise the privileges of his certificate until 01 June 2019.

1.5.3 The pilot also held a private pilot licence (Helicopter) issued by the CAA on 26 May 1995.

1.6 Aircraft information

1.6.1 The Pipistrel Taurus Electro G2, serial number 146 T ET was constructed in Slovenia in 2015 and exported to New Zealand. It was registered in New Zealand on 23 November 2015 and issued with a non-terminating microlight aircraft flight permit, Class 2, registration ZK-GEL.

1.6.2 The aircraft is a motor glider with a 15 m wingspan, with side-by-side seating, and is constructed almost entirely of composite materials. The glider features an electric propulsion system to allow for self-launch take-offs, which can also be utilised when gliding to help sustain the flight.

- 1.6.3 The propulsion system is housed behind the cockpit area in an engine bay. When the propulsion system is being utilised, it is extended out of the engine bay and into the airflow. When not in use, it is retracted into the engine bay.
- 1.6.4 Two battery packs, each comprising- two battery boxes, containing 17 lithium polymer cells, provide electrical energy to the propulsion system (motor). Each of the battery boxes has a battery monitoring system, which monitors and balances the system voltage.
- 1.6.5 An electrical system control & monitoring system (ESYS-MAN) also communicates with the battery management system and delivers information to the pilot about the battery's state of charge and health.
- 1.6.6 A caution in the battery manufacture's material data safety sheet states, 'If cells overheat due to an external source or improper use, electrolyte leakage or battery container rupture may occur and release inner/component material into the environment.'³
- 1.6.7 The manufacturer further cautions, 'The contents of a leaking or ruptured battery can cause respiratory tract irritation, mucus membrane irritation and oedema [if inhaled]'. The material safety data sheet offers first aid advice, 'In the event of battery rupture or explosion, evacuate personnel from contaminated area and provide maximum ventilation to clear out fumes/gases'.
- 1.6.8 Post-accident calculations established that the glider's weight and centre of gravity were likely to have been within prescribed limits, and not considered a contributing factor.
- 1.6.9 The glider was subjected to a wheels-up landing on 24 September 2017 at Kaikohe aerodrome.
- 1.6.10 The last recorded scheduled maintenance performed on ZK-GEL was completed on 3 November 2017. This involved an annual microlight aircraft inspection and flight permit validation. The glider was deemed airworthy and released to service.

1.7 Meteorological information

- 1.7.1 The Kerikeri terminal aerodrome forecast (TAF), 23 km north north-east of the accident site, which was issued at 0935 NZDT, forecast the surface wind to be from 080 degrees (True) at 12 kt. The wind at 2000 ft was forecast to be 070 degrees (True) at 15 kt.

The Kerikeri TAF forecast 15 km of visibility with light showers of rain, and a cloud base of 7000 ft. The same forecast indicated temporary fluctuations of 5000 m visibility in moderate showers of rain, and a cumulonimbus⁴ cloud base of 3000 ft.

³ Kokam SLPB Material Safety Data Sheet.

⁴ Cumulonimbus involves heavy masses of cloud with great vertical development.

- 1.7.2 The area forecast (ARFOR⁵) for the Far North forecast the visibility to reduce to 5000 m in moderate showers of rain, with a cloud base of 3000 ft.
- 1.7.3 There were two other pilots flying in the same area about the time ZK-GEL became airborne. One reported “the conditions for flying were safe but it wasn’t ideal gliding conditions due to the moderate thermal activity”.
- 1.7.4 No evidence was found to indicate the weather contributed to this accident.

1.8 Aids to navigation

- 1.8.1 The aircraft was fitted with an LX 9000. The LX 9000 is an advanced computer unit which has preloaded navigational information, a variometer⁶ and a FLARM.⁷

1.9 Communications

- 1.9.1 The glider was equipped with a f.u.n.k.e. AVIONICS GmbH ATR833 very high frequency radio.
- 1.9.2 While preparing the glider for flight the pilot conducted a radio check to confirm the radio was functioning correctly.
- 1.9.3 The last radio call heard from the pilot of ZK-GEL was “rolling on one three”. No subsequent radio calls were heard from the pilot.

1.10 Aerodrome information

- 1.10.1 Kaikohe aerodrome is a non-certified and uncontrolled aerodrome, three NM south-east of Kaikohe township. ZK-GEL was hangared at Kaikohe aerodrome.
- 1.10.2 On the day of the accident, the pilot carried out a self-launch take-off from Runway 13.

1.11 Flight recorders

- 1.11.1 The glider was fitted with an LX 9000, which has a recording capability. During the accident sequence, the unit’s SD card was mechanically damaged, and the data was unable to be recovered.
- 1.11.2 The ESYS-MAN also has a recording capability. The micro SD card from the ESYS-MAN of ZK-GEL was extracted after the accident and found to be electrically unresponsive. As a result, the data it contained also could not be recovered.

⁵ Area forecasts (ARFOR) are forecasts for a specific region. This forecast was issued for the Far North area which includes the area of the accident.

⁶ A variometer is a device used to inform the pilot of the rate of a descent or climb.

⁷ FLARM is a traffic awareness and collision avoidance technology for general aviation aircraft.

1.12 Wreckage and impact information

1.12.1 The accident occurred on open farmland approximately 0.8 NM west of Kaikohe aerodrome (see Figure 1). The wreckage trail indicated the glider was in a left-hand turn and on a heading of 257 degrees (True) when it struck the ground.

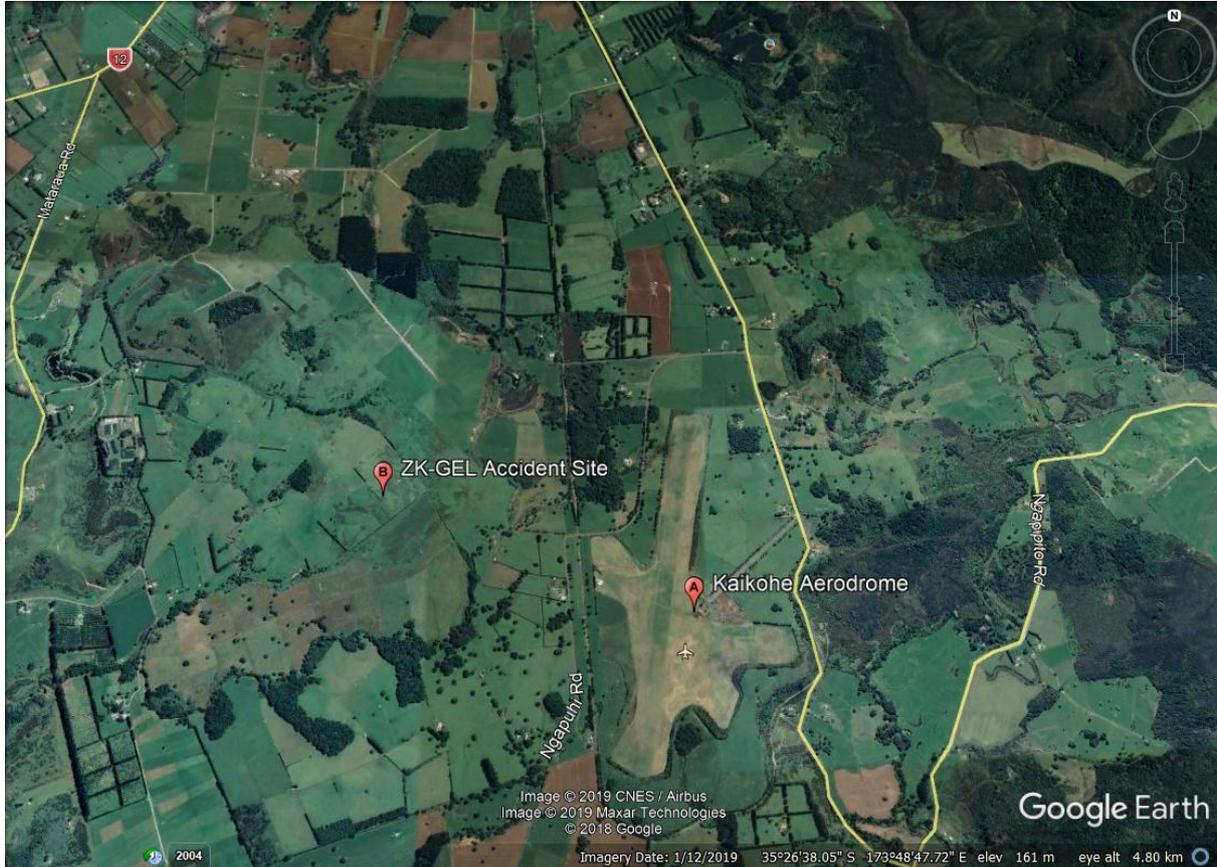


Figure 1: Location of the accident site.

1.12.2 The wings and wing spars were located 80 m before the initial impact site indicating an in-flight break up had occurred (see Figure 2).

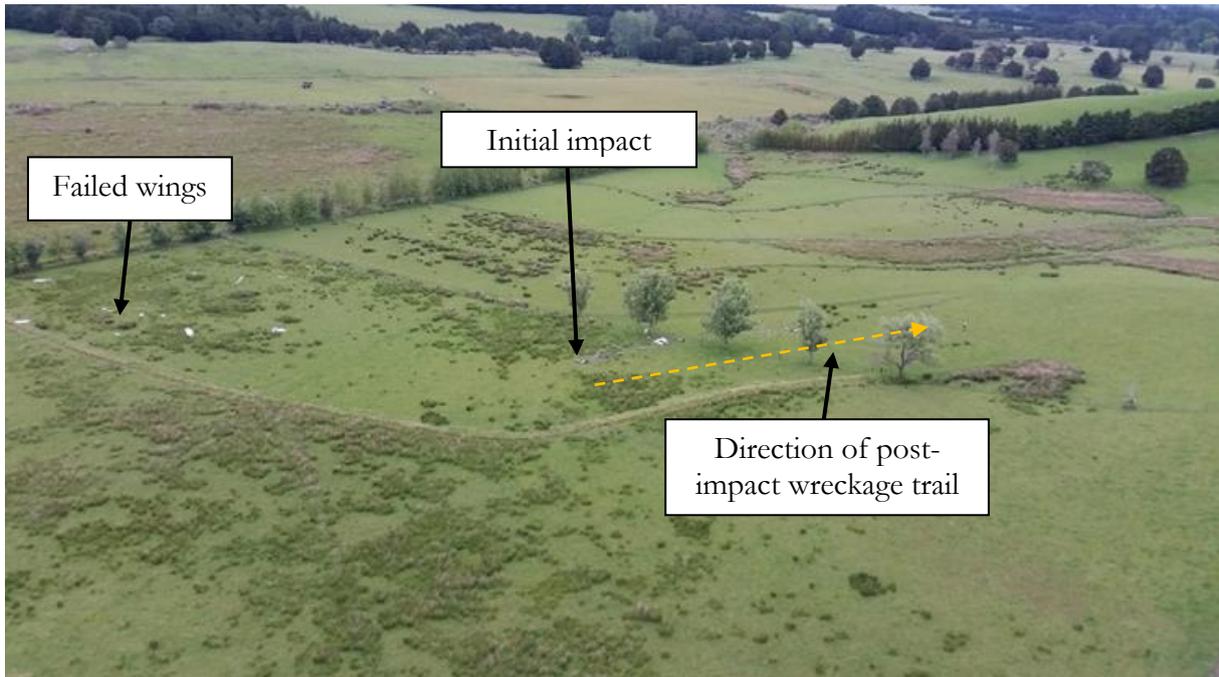


Figure 2: Accident site

1.12.3 The glider's fuselage struck the ground on its left side at high speed, with the cockpit area experiencing significant disruption. The debris field extended from the initial impact site approximately 95 m in the direction of travel.

1.12.4 During the on-site wreckage examination, pre-accident aircraft control integrity was established as far as possible.

1.12.5 It was noted that the glider's propulsion system was retracted and secure in the engine bay when the glider struck the ground.

1.13 Medical and pathological information

1.13.1 Post-mortem examination showed that the pilot died of multiple injuries sustained during the impact sequence.

1.13.2 A report produced by the pathologist stipulated that an examination of the heart showed evidence of a previous myocardial infarction (heart attack). The CAA Principal Medical Officer was consulted and reported, 'while it is not possible to exclude it with certainty, I do not believe that a further cardiac event is a likely contributor'.

1.13.3 The post-mortem toxicology results showed the presence of alcohol, consistent with post-mortem artefact due to decomposition, and not indicative of prior alcohol consumption.

1.13.4 Apart from caffeine, no other drugs were detected during the toxicology testing.

1.14 Fire

1.14.1 During the wreckage examination, evidence of an in-flight fire was identified. The fire appeared to have originated from, and was isolated to, the battery pack located behind the pilot's seat (see Figure 3).



Figure 3: Origin point of the battery fire

1.14.2 Soot was evident on the leading edge of the wing roots and a section of the plexy canopy. These components were located 80 m before the initial impact site.

1.14.3 The pilot's seat and rudder control cables showed evidence of in-flight heat damage and sooting. These components were separated from the heat source during the impact sequence.

1.14.4 Impact forces ejected the battery packs containing the four battery boxes from the fuselage. Subsequently, a number of battery cells were ejected from the battery boxes. Some of the ejected cells ignited during or after the impact sequence and continued to burn for a time after coming to rest.

1.14.5 The glider manufacturer's *Flight manual and Maintenance manual*⁸ provide guidance on battery system fires. It stipulates, 'land and abandon the aircraft as soon as possible'.

1.15 Survival aspects

1.15.1 Evidence of significant smoke within the cockpit prior to the glider impacting the ground was identified.

1.15.2 Although the glider was fitted with a Galaxy rescue system (GRS), there was no evidence of it having been deployed nor of any attempts to deploy it.

1.15.3 Although the pilot was wearing a harness restraint, the impact forces were not survivable.

1.16 Tests and research

1.16.1 Following an in-flight battery fire incident involving an HPH Glasflugel 304 eS type glider in West Sussex, England, the Air Accidents Investigation Branch (AAIB) conducted an investigation. Their subsequent report could not identify the cause of the battery fire. They conducted independent testing, however, which revealed the presence of metallic debris in 7 of the 11 lithium polymer cells sampled. Furthermore, vibration testing identified that metallic debris could cause fretting on the cell pouch. The metallic fretting was not significant enough during testing to penetrate the cell pouch which would cause arcing. However, during other testing where penetration was achieved 'the electrical arcing was immediately followed by rapid inflation of the pouch, followed by light grey smoke, followed by flames.' For further information refer to AAIB Bulletin: 9/2018 G-GSGS EW/C2017/08/01.

1.16.2 The safety investigation identified other international occurrences involving lithium polymer battery thermal events. Although these involved different models of glider, a combination of two additional areas of interest are of note:

- The battery packs had experienced some degree of impact, with the potential to compromise the battery structure.
- The batteries had not been charged in accordance with the manufacturer's recommendations.

⁸ 'Flight manual and Maintenance manual' is the title given to the manufacturer's singular manual, used as the primary reference for operating and maintenance procedures and limitations.

- 1.16.3 The glider manufacturer's *Flight manual and Maintenance manual* provides direction on battery charging. This includes two cautions:

CAUTION! DURING THE PERIODS OF NOT USING THE AIRCRAFT, IT IS REQUIRED TO PERFORM A KEEP-ALIVE (STORAGE) CHARGE ONCE EVERY 30 DAYS. TO DO SO, CONNECT THE CHARGER AND SELECT 'REST CHARGE' MODE, THAN WAIT UNTIL COMPLETED. THIS WILL REFRESH THE BATTERIES AND KEEP THE SYSTEM IN A HEALTHY STATE. ALSO, AFTER A PERIOD OF NO-FLYING ACTIVITY, PERFORM A FILL-UP CHARGE 24 HOURS BEFORE THE ACTUAL FLIGHT.

and

CAUTION! AFTER PERFORMING A FULL CHARGE, DO NOT KEEP THE BATTERY AT A VOLTAGE OVER 260 VOLTS FOR MORE THAN 5 DAYS. EITHER PERFORM A FLIGHT OR RUN THE MOTOR TO DISCHARGE THE BATTERY TO THE RECOMMENDED 240-260 VOLTS FOR STORAGE.

- 1.16.4 During significant absences from New Zealand, the pilot would fully charge the glider batteries and leave them charged while the glider was stored in its trailer. The pilot was also known to leave the batteries charging for substantial periods of time between flights. This is contrary to the manufacturer's *Flight manual and Maintenance manual*.
- 1.16.5 Research shows that, if the manufacturer's instructions for charging are not followed, lithium polymer batteries are prone to hydrogen and dendrite build-up, that may lead to a battery short circuit, failure, smoking and/or fire.
- 1.16.6 The glider manufacturer's *Flight manual and Maintenance manual* offers no guidance or direction on what to do when a battery is damaged, or damage is suspected.
- 1.16.7 Tests conducted by Concordia University (Montréal, Canada) have shown that several hazardous gases can be produced during a lithium polymer battery thermal event. These gases include carbon dioxide (CO²), carbon monoxide (CO), and hydrogen fluoride (HF).⁹ CO² and CO are known asphyxiants, while HF is an irritant which can cause severe pain and corrosive damage upon contact with a person's throat, eyes, skin, and mucous membrane.¹⁰

⁹ Concordia University. "Lithium Batteries" Accessible at: https://www.concordia.ca/content/dam/concordia/services/safety/docs/EHS-DOC-147_LithiumBatteries.pdf

¹⁰ Centers for Disease Control and Prevention. "Facts about Hydrogen Fluoride (Hydrofluoric Acid)" Accessible at: <https://emergency.cdc.gov/agent/hydrofluoricacid/basics/facts.asp>

1.17 Organisational and management information

- 1.17.1 The administration of glider pilot certificates and medicals is conducted by a Part 149 aviation recreation organisation (ARO), in this case Gliding New Zealand.
- 1.17.2 Gliding New Zealand's *Manual of Approved Procedures* states that, 'Individual pilots shall retain their own Medical Declaration / Certificate and provide a copy to their CFI [Chief Flying Instructor] for record keeping purposes'. A copy of the pilot's medical declaration was unable to be located.

Although the pilot's medical declaration could not be located, the safety investigation found no evidence to suggest the pilot was medically unfit to fly. Despite this, the CAA has raised Safety Action CAA 21A194 bringing the non-conformance of the administration and retention of pilot medicals to the attention of the CFI of the local gliding club and Gliding New Zealand.

1.18 Additional information

- 1.18.1 The glider manufacturer issued a Mandatory Service Bulletin, Taurus Electro G2 Battery Safety Service Bulletin (SB) SB-132-00-80-001, on 28 June 2018. The SB mandated the immediate grounding of all Taurus Electro G2 gliders until further notice.
- 1.18.2 The glider manufacturer has advised that all Electro G2 gliders have been updated to Electro G2.5, making this SB redundant.

1.19 Useful or effective investigation techniques

- 1.19.1 The CAA acknowledges the assistance provided by the New Zealand Police Serious Crash Unit and the Aircraft Accidents Investigation Board.

2. Analysis

- 2.1 While airborne on a local flight the pilot was faced with a difficult in-flight emergency, in the form of a battery thermal event.
- 2.2 The thermal event originated in the lithium polymer battery pack located behind the pilot's seat, resulting in fumes and smoke filling the cockpit. This would have likely had the effect of degrading the pilot's performance and ability to control the glider while dealing with the in-flight emergency.
- 2.3 The location of the wreckage in relation to Kaikohe aerodrome's Runway 13 indicates the pilot was likely attempting to return to the aerodrome to conduct an emergency landing. During its descent, the glider exceeded speed limitations which are designed to maintain the structural integrity of the glider. This led to the structural failure of the wings and the subsequent in-flight break-up.

The manufacturer provided commentary on the structural failure of the glider's wings on descent: 'The shear-lines observed on the wing are consistent with a structure overload condition – they occurred where we would have expected'.

- 2.4 Although the pilot was faced with an in-flight emergency it is likely he did not deploy the GRS because of the in-flight fire. This is in line with the guidance stipulated in the *Flight manual and Maintenance manual*, which recommends to 'land and abandon the aircraft as soon as possible'.
- 2.5 Although the pilot followed the emergency procedure stipulated in the *Flight manual and Maintenance manual*, it is not considered that the information provided is adequate to reflect the severity of such an in-flight fire situation. As such the CAA has raised Safety Action CAA 21A292 recommending that the manufacturer amend the *Flight manual and Maintenance manual* to include specific information to address in-flight battery fires.
- 2.6 It was not possible to definitively conclude why the batteries experienced a thermal event, which led to the in-flight break-up. However, three possible scenarios are:
- during charging and discharging cycles the pilot did not follow the manufacturer's battery management instructions
 - the batteries were damaged at some stage, possibly during the wheels-up landing
 - arcing occurred between battery cells, possibly caused by penetration of one or more of the cells by debris.
- 2.7 It is known that the glider experienced a wheels-up landing in 2017: however, no documentation was provided to the CAA, maintenance provider, or appropriate Part 149 ARO. Consequently, the effect, if any, of the wheels-up landing on the battery packs is unknown. Furthermore, the *Flight manual and Maintenance manual* provides no guidance on what to do if battery damage is suspected. As such CAA Safety Action CAA 21A291 has been raised recommending the glider manufacturer amend the *Flight manual and Maintenance manual* to include guidance on suspected battery damage.
- 2.8 With regard to the battery charging instructions, the *Flight manual and Maintenance manual* gives specific guidance on how to manage and maintain the integrity of the batteries during the charging and discharging processes.
- 2.9 Witnesses stated that when the glider was not in use, the pilot left it on charge. The time periods involved ranged from several days to several weeks. These witnesses also stated that, while the pilot was out of the country, for periods of two to three months each year, the glider was disconnected from its charger and stored in its trailer. This practice is not consistent with the battery management instructions in the *Flight manual and Maintenance manual*.

- 2.10 It could not be determined why the pilot deviated from the charging instructions specified in the glider's *Flight manual and Maintenance manual*. It is critical to follow the manufacturer's instructions when charging lithium polymer batteries, as such, CAA Safety Action CAA 21A212 has been raised for the CAA to remind pilots of this through its regulatory activities.
- 2.11 Due to the significant disruption to the glider and battery assemblies during the accident sequence, it was not possible to identify any evidence of inter-cell arcing. As such, inter-cell arcing as the initiator of the on-board thermal event could not be excluded.
- 2.12 The glider was fitted with an LX 9000 and an ESYS-MAN, both of which have recording capabilities. During the accident sequence both recording devices were compromised resulting in the loss of access to any recorded data. It should be noted that neither of these devices are deemed crashworthy and their failure was consistent with the crash disruption and dynamics of this accident.
- 2.13 Lithium polymer battery fires burn at a very fast rate, releasing significant energy and toxic fumes. This outcome is generally the same regardless of the cause of the thermal event. Within seconds a cockpit can be filled with a toxic smoke, which may render the occupants impaired or completely incapacitated. Given the speed and seriousness that such a situation may develop, Safety Action CAA 21A213 has been raised for the CAA to encourage aviation participants to give due consideration, when modifying or maintaining their aircraft, to early fire detection, fire containment, and fire proofing systems. This is to allow pilots additional time to land their aircraft and increase survivability.

3. Conclusions

- 3.1 During flight, one of the lithium polymer batteries fitted to the glider experienced a thermal event.
- 3.2 At the time of the in-flight battery thermal event, the glider had completed the take-off phase and was actively gliding with the motor retracted.
- 3.3 The pilot was presented with a challenging in-flight emergency.
- 3.4 It is likely that the pilot was attempting to return to the aerodrome to carry out an emergency landing.
- 3.5 The glider was in a high-speed descent, when the wings failed due to structural overload.
- 3.6 The accident was not survivable.

- 3.7 The lithium polymer batteries were not maintained in accordance with the manufacturer's instructions.
- 3.8 The manufacturer's *Flight manual and Maintenance manual* lacks appropriate warning information regarding in-flight fires.
- 3.9 The aircraft was deemed airworthy at the time of the accident.
- 3.10 The pilot's medical certificate and declaration were not able to be located.

4. Safety actions/recommendations

- 4.1 CAA Safety Action CAA 21A194 has been raised bringing the non-conformance of the administration and retention of pilot medicals to the attention of the CFI at the local gliding club and Gliding New Zealand.
- 4.2 CAA Safety Action CAA 21A212 has been raised for the CAA to remind pilots that it is critical to follow the manufacturer's instructions when charging lithium polymer batteries.
- 4.3 CAA Safety Action CAA 21A213 has been raised for the CAA to encourage aviation participants to give due consideration, when modifying or maintaining their aircraft, to early fire detection, fire containment, and fire proofing systems. This is to allow pilots additional time to land their aircraft and increase survivability.
- 4.4 CAA Safety Action CAA 21A292 has been raised for the CAA to recommend that the glider manufacturer amend the *Flight manual and Maintenance manual* to emphasise the possibility and severity of an in-flight battery fire.
- 4.5 CAA Safety Action CAA 21A291 has been raised for the CAA to recommend that the glider manufacturer amend the *Flight manual and Maintenance manual* to include guidance on suspected damaged batteries and the process for having these checked.

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