



National Transportation Safety Board Aviation Accident Final Report

Location:	Boulder, CO	Accident Number:	CEN11FA259
Date & Time:	04/01/2011, 1715 MDT	Registration:	N633BG
Aircraft:	BURKHART GROB FLUGZEUGBAU G102 CLUB ASTIR IIIB	Aircraft Damage:	Substantial
Defining Event:	Loss of control in flight	Injuries:	1 Fatal
Flight Conducted Under:	Part 91: General Aviation - Personal		

Analysis

Data obtained from an onboard tracking device depicted the glider maneuvering between 21,000 to 23,800 feet mean sea level (msl) before entering a spiral descent, which is consistent with a loss of control. Several eyewitnesses observed the glider descending in a steep spiral turn toward the ground. The glider collided with high voltage transmission wires and terrain in a sparsely wooded area. An examination of the wreckage did not reveal any preimpact anomalies with the glider. Testing of the glider's oxygen bottle, regulator, and mask detected no anomalies that would have precluded normal operation of the oxygen system. A review of audio recordings revealed that the pilot's radio transmissions did not have the muffled sounds normally associated with the use of an oxygen mask, suggesting that the pilot may not have been wearing the oxygen mask during a portion of the flight. According to Federal Aviation Administration guidance, on average, a pilot can operate at 22,000 feet msl for about 5 to 10 minutes before losing consciousness due to a lack of oxygen (hypoxia); the glider was above 22,000 feet msl for 13 minutes 36 seconds. Therefore, it is possible that the pilot became incapacitated due to hypoxia.

Additionally, the pilot, who was diabetic and routinely self-tested his blood sugar levels, recorded a blood sugar level of 58 mg/ml about 1 hour 40 minutes before the flight; according to the U.S. Library of Medicine, a blood sugar level below 70 mg/dl is considered low (hypoglycemia). Although it is likely that the pilot addressed the low blood sugar level by eating or taking glucose tablets, his blood sugar level at the time of the accident is unknown. Hypoxia and hypoglycemia have similar symptoms including headache, blurred vision, tingling or numbness, and unclear thinking, and both conditions can lead to loss of consciousness if they are not promptly remedied. There was no record of the pilot being trained to recognize hypoxia symptoms, and it is possible that he may have mistaken the symptoms of hypoxia for hypoglycemia. It is likely that the pilot became incapacitated and lost control of the glider; however, it could not be determined if the pilot's incapacitation was a result of hypoxia, hypoglycemia, or a combination of the two conditions.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:
The pilot's incapacitation for undetermined reasons, which resulted in a loss of control.

Findings

Aircraft	Performance/control parameters - Not attained/maintained (Cause)
Personnel issues	Impairment/incapacitation - Pilot (Cause) Aircraft control - Pilot (Cause)

Factual Information

HISTORY OF FLIGHT

On April 1, 2011, about 1715 mountain daylight time, a Burkhart Grob Flugzeugbau G102 Club Astir IIIB glider, N633BG, was substantially damaged upon collision with high voltage transmission wires and terrain near Boulder, Colorado. The private glider pilot was fatally injured. The glider was registered to Mile High Youth Gliding Association, Inc., and operated by Mile High Gliding under the provisions of 14 Code of Federal Regulations Part 91 as a personal flight. Visual meteorological conditions prevailed for the flight, which operated without a flight plan. The flight originated from Boulder Municipal Airport (BDU), Boulder Colorado, at 1628.

The pilot of the tow plane reported that the glider released from the tow plane at 13,900 feet mean sea level. The tow plane pilot characterized the air conditions as bumpy with updrafts of 1,000 feet per minute in several areas.

Several eyewitnesses reported the glider in a spiral turn towards the ground. All witnesses reported seeing a steep bank angle. One witness observed the glider level off momentarily, then pitch nose up and climb, and then pitch nose down and descend.

PERSONNEL INFORMATION

The pilot, age 46, held a private glider pilot certificate issued on September 24, 2010. A review of the pilot's logbook revealed the pilot had logged 104.4 hours total time, with a majority of the flight time logged in the accident glider.

The pilot had previously been diagnosed with diabetes and had actively monitored his blood sugar level. The pilot's last recorded blood sugar reading was taken on the day of the accident at 1450, with a reading of 58 mg/dl. It is not known what nutrition the pilot may have had prior to flight. The pilot had reported his diabetic condition to personnel at Mile High Gliding, which required the pilot to fly with glucose tablets in order to help maintain his blood sugar levels.

AIRCRAFT INFORMATION

The single-seat, low wing glider, with composite construction, serial number 5633CD, was manufactured in 1985. A review of the maintenance logbook revealed an annual inspection was completed on May 1, 2010, at an airframe time of 2,113.4 hours. On March 19, 2011, the glider wing spar spigots were inspected in accordance with Airworthiness Directive 2011-01-03 and were found free of cracks.

METEOROLOGICAL INFORMATION

At 0630, the National Weather Service (NWS), Boulder, Colorado, released a soaring forecast for April 1, 2011. The data was based off a 0600 upper air sounding taken from Denver, Colorado. The thermal soaring index was forecasted as "excellent," with an expected 1,122 feet per minute climb between the altitudes of 13,800 and 18,100 feet mean sea level (msl). Above the thermal layer was the potential for mountain wave turbulence between 18,000 feet and 20,000 feet msl. An upper air sounding taken at 1800 remained consistent with the 0630 sounding, with winds at 20,000 feet msl from about 310 degrees at 50 knots. Satellite imagery for the Front Range area depicted a series of clouds near the mountain range with characteristics of being suspended by mountain wave activity.

At 1712, the automated surface weather report from BDU reported, winds from 300 at 17 knots, gusting to 21 knots, visibility 10 statute miles, and skies clear.

COMMUNICATIONS

Federal Aviation Administration (FAA) inspectors reviewed audio recordings of the pilot's radio transmissions. The inspectors noted the lack of muffled sounds normally associated with the use of the oxygen mask during radio communications from the pilot.

WRECKAGE AND IMPACT INFORMATION

The accident site was located in a sparsely wooded area. The first impact signatures were white paint transfers and fiberglass deposits on two parallel high voltage transmission wires, which were strung approximately 75 feet above ground level (agl). The debris path followed a 075 degree heading. Directly under the west set of transmission wires was the right aileron. Metal rods from both ailerons were found in an area of scorched terrain near the transmission wires. Both rods were bent with signatures of a wire strike; in addition, they were thermally damaged with evidence of arcing. The main wreckage was located approximately 495 feet east of the transmission wires and consisted of: the main fuselage (inverted), 15.5 feet of the left wing, and 2 feet of the right wing. In addition, the empennage had separated from the fuselage about 4 feet aft of the centerline tire, was fractured in multiple places, and was distributed throughout the debris path. The glider's flight controls were fractured in multiple places; the fractures surface displayed signatures of overload or were indistinguishable due to melting. The A-14 diluter-demand oxygen regulator separated from the fuselage and was found in the debris path. The A-14's dial indicated an altitude just outside the "normal" altitude placard setting and the dilutor control was found in the "normal" position (100-percent position not selected). The oxygen bottle was located in the cockpit and the tank's valve was found near the full open position. The oxygen bottle, A-14 regulator, and mask were removed from the glider and tested. No preimpact anomalies were detected with the oxygen system. Examination of the glider's airframe did not identify any preimpact anomalies.

MEDICAL AND PATHOLOGICAL INFORMATION

On April 2, 2011, an autopsy was performed on the pilot by the Boulder County Coroner's medical examiner as authorized by the Boulder County Coroner. The manner of death was ruled an accident.

The FAA Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma, performed forensic toxicology on specimens from the pilot. The report noted the following:

Chlorpheniramine detected in Liver

Chlorpheniramine detected in Urine

Dextromethorphan detected in Urine

Dextromethorphan detected in Liver

Dextrorphan detected in Urine

Doxylamine detected in Liver

Doxylamine detected in Urine

Pseudoephedrine detected in Liver

Information obtained from the U.S. National Library of Medicine listed chlorpheniramine as a treatment for the symptoms of allergies, hay fever, and the common cold. Dextromethorphan is listed as being used to “temporarily relieve cough caused by the common cold, the flu, or other conditions.” Dextrorphan is listed as a metabolite of dextromethorphan. Doxylamine is listed as being used “in combination with decongestants and other medications to relieve sneezing, runny nose, and nasal congestion caused by the common cold.” Pseudoephedrine is listed as being used to “relieve nasal congestion caused by colds, allergies, and hay fever.”

ADDITIONAL INFORMATION

Volkslogger device

The glider was equipped with a Volkslogger global positions system (GPS) data recorder. Data extracted from the device documented the accident flight. The device began recording at 1607 with data points recorded every three seconds. The data displayed a track consistent with the glider being air towed from BDU at 1628 to a point about 3.5 nautical miles west of the airport. The glider appeared to maneuver clear of the tow plane at 1642, when the glider maneuvered towards Jamestown, Colorado, before it turned back towards Boulder, Colorado. The data showed the glider continued to maneuver and revealed that the pilot ascended through 20,000 msl at 1651:50. The pilot then ascended through 22,000 msl at 1654:20. The pilot continued to maneuver the glider between 21,000 and 23,800, before descending at 1707:56 in spiral-like turns.

Hypoxia

The FAA Pilot’s Handbook of Aeronautical Knowledge (FAA-H-8083-25A), released in 2008, warned pilots about the hazards of hypoxia. It identified hypoxic hypoxia as “a result of insufficient oxygen available to the body as a whole.” The handbook included a list of symptoms of hypoxia: cyanosis, headache, decreased reaction time, impaired judgment, euphoria, visual impairment, drowsiness, lightheaded sensation, tingling in fingers and toes, and numbness. These symptoms will vary with each individual. There is no record of the pilot having received hypoxia training.

An excerpt from the handbook, outlined the time of useful consciousness:

Altitude (ft msl)	Time of Useful Consciousness
20,000	30 minutes or more
22,000	5 to 10 minutes
25,000	3 to 5 minutes

Hypoglycemia

Prior to flight, the pilot had recorded a blood sugar level of 58 mg/dl. Information obtained from the U.S. National Library of Medicine considered that blood sugar below 70 mg/dl as low. Among the listed possible symptoms of hypoglycemia were: blurred vision, headache, shaking, tingling or numbness, weakness, and unclear thinking. Some of the symptoms of hypoglycemia could match those of hypoxia.

History of Flight

Maneuvering	Loss of control in flight (Defining event)
Uncontrolled descent	Collision with terr/obj (non-CFIT)

Pilot Information

Certificate:	Private	Age:	46, Male
Airplane Rating(s):	None	Seat Occupied:	Single
Other Aircraft Rating(s):	Glider	Restraint Used:	Seatbelt, Shoulder harness
Instrument Rating(s):	None	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	Yes
Medical Certification:	Sport Pilot None	Last Medical Exam:	
Occupational Pilot:	No	Last Flight Review or Equivalent:	09/23/2010
Flight Time:	104 hours (Total, all aircraft), 70 hours (Pilot In Command, all aircraft), 45 hours (Last 90 days, all aircraft), 10 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Manufacturer:	BURKHART GROB FLUGZEUGBAU	Registration:	N633BG
Model/Series:	G102 CLUB ASTIR IIIB	Aircraft Category:	Glider
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Normal	Serial Number:	5633CB
Landing Gear Type:	Tandem	Seats:	1
Date/Type of Last Inspection:	05/01/2010, Annual	Certified Max Gross Wt.:	1100 lbs
Time Since Last Inspection:		Engines:	0
Airframe Total Time:	2113 Hours	Engine Manufacturer:	
ELT:	Not installed	Engine Model/Series:	
Registered Owner:	MILE HIGH YOUTH GLIDING ASSOCIATION INC	Rated Power:	
Operator:	MILE HIGH GLIDING	Air Carrier Operating Certificate:	None

Meteorological Information and Flight Plan

Observation Facility, Elevation:	BDU, 5288 ft msl	Observation Time:	1712 MDT
Distance from Accident Site:	4 Nautical Miles	Condition of Light:	Day
Direction from Accident Site:	326°	Conditions at Accident Site:	Visual Conditions
Lowest Cloud Condition:	Clear	Temperature/Dew Point:	21° C / -12° C
Lowest Ceiling:		Visibility	10 Miles
Wind Speed/Gusts, Direction:	17 knots/ 21 knots, 300°	Visibility (RVR):	
Altimeter Setting:	29.88 inches Hg	Visibility (RVV):	
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Boulder, CO (BDU)	Type of Flight Plan Filed:	None
Destination:	Boulder, CO (BDU)	Type of Clearance:	None
Departure Time:	1628 MDT	Type of Airspace:	

Airport Information

Airport:		Runway Surface Type:	
Airport Elevation:		Runway Surface Condition:	
Runway Used:		IFR Approach:	
Runway Length/Width:		VFR Approach/Landing:	

Wreckage and Impact Information

Crew Injuries:	1 Fatal	Aircraft Damage:	Substantial
Passenger Injuries:	N/A	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 Fatal		

Administrative Information

Investigator In Charge (IIC):	Jason T Aguilera	Adopted Date:	05/03/2012
Additional Participating Persons:	Mark Schmidt; FAA FSDO; Denver, CO David Campbell; Mile High Gliding; Boulder, CO		
Publish Date:	05/03/2012		
Investigation Docket:	http://dms.nts.gov/pubdms/search/dockList.cfm?mKey=78740		

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