



Transportation
Safety Board
of Canada

Bureau de la sécurité
des transports
du Canada



AIR TRANSPORTATION SAFETY INVESTIGATION REPORT A24W0059

STALL, SPIN, AND COLLISION WITH TERRAIN

Privately registered
Sportinè Aviacija ir Ko LAK-17B FES (glider), C-FMXC
Black Diamond/Cu Nim Aerodrome, Alberta, 1.8 NM SE
29 May 2024

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History of the flight

On 29 May 2024, the pilot and owner of the Sportinè Aviacija ir Ko (Sportinè) LAK-17B FES glider (registration C-FMXC, serial number 229) assembled his aircraft in preparation to participate in a soaring competition. The competition was based out of the Black Diamond/Cu Nim Aerodrome (CEH2) in Alberta. The day's event was a 3-leg cross-country flight totalling 401 km toward the southeast of CEH2.

After rigging the glider, the pilot attended a safety briefing at 1030¹ with the other competitors. He prepared his newly acquired flight computer for the cross-country flight and waited his turn to depart. The 1st group of gliders departed at about 1230, and the occurrence pilot's group of gliders was scheduled to go at 1300. Conditions for gliding were poor, i.e., there was little lift in

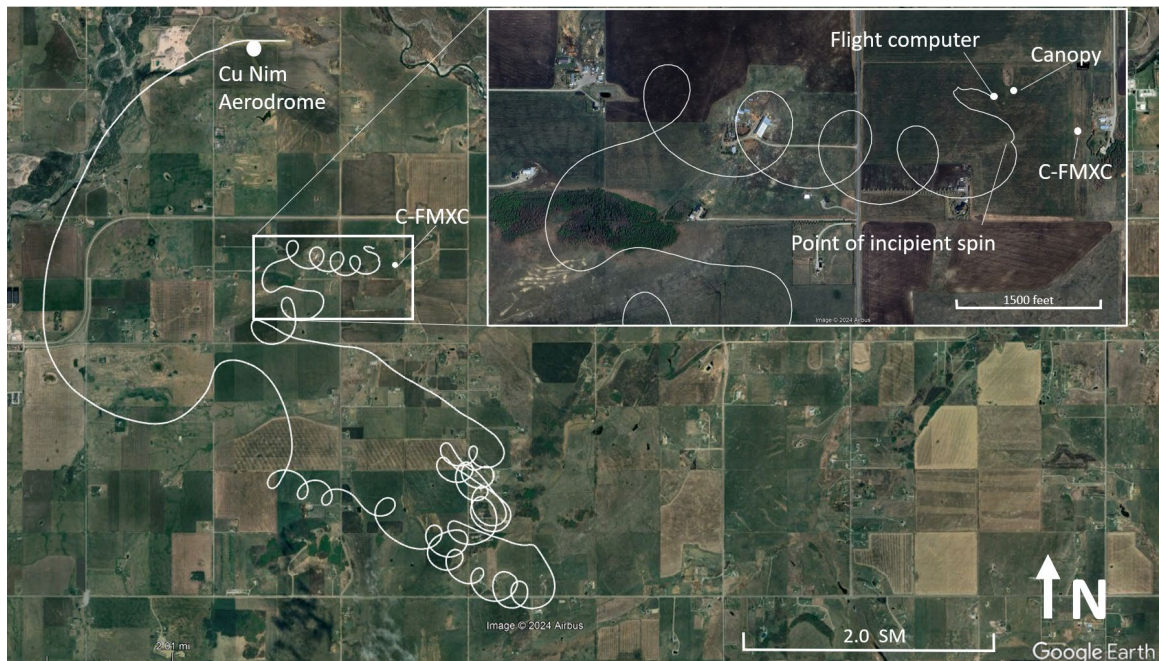
¹ All times are Mountain Daylight Time (Coordinated Universal Time minus 6 hours).

the atmosphere, and gliders from the 1st group were returning to the aerodrome after flying for less than 20 minutes.

At 1301, the occurrence pilot was the 6th in his group to depart. His glider was towed to 2000 feet above ground level (AGL) to the south of CEH2 before it released from the towline. Some of the gliders from his group also returned to the aerodrome shortly after launching.

For the next 23 minutes, the occurrence pilot attempted to gain altitude by thermaling a few miles south of CEH2 (Figure 1); however, he only gained a few hundred feet in total. He then turned toward the aerodrome, and while on the left downwind leg for Runway 25, he attempted to gain more altitude and conducted 5 turns to the left.

Figure 1. Occurrence flight path, with a close-up view of the 5 left turns and incipient spin in inset (Source of main and inset images: Google Earth, with TSB annotations based on data from the Naviter Oudie N and LXNAV FlarmMouse devices on board the occurrence glider)



The glider averaged a height of 1350 feet AGL during the turns and gained some altitude but not a significant amount. While in the 5th turn to the left, the glider stalled at an indicated airspeed of 74.7 km/h² and entered an incipient spin to the right (Figure 1, inset). The flight data show a loss of about 200 feet³ and a subsequent increase of indicated airspeed to about 185 km/h. The glider recovered from the incipient spin and gained about 10 feet in altitude before its canopy was ejected.

² The occurrence glider flight manual indicates a wings-level stall speed of 80 km/h (43.2 knots), without ballast, and flaps set to +3. (Source: Sportinè Aviacija ir Ko, *Flight Manual for the Self-sustaining Powered Sailplane LAK-17B FES* (19 April 2022), Section 5.2.2: Stall speeds, p. 5-3 Appr.).

³ The occurrence aircraft flight manual indicates a loss of 50 m (164 feet) in a turning flight stall if recovery is immediate (Source: Ibid.).

Observers at CEH2, who were attending to the returning gliders, saw something fall from the glider and realized it was the canopy, followed shortly by the pilot bailing out of the glider with no visible parachute canopy. The glider then pitched up and entered a spin to the left and collided with terrain, resulting in substantial damage.

The pilot, who was wearing a parachute, impacted the ground and was fatally injured. Information gathered during the investigation did not indicate that the pilot contacted the glider during the bailout.

Weather information

The aerodrome special meteorological report (SPECI) issued at 1321 for Springbank/Calgary Airport (CYBW), Alberta, the closest airport to the accident site, 25 NM to the northwest, indicated the following:

- Winds from 300° true at 21 knots, gusting to 27 knots
- Visibility of 9 statute miles
- Clear sky
- Temperature 14 °C, dew point –6 °C
- Altimeter setting 29.81 inches of mercury

Surface wind information gathered from sources at CEH2 indicated the winds were predominantly from the west-northwest at 15 knots, gusting to 20 knots, with high overcast clouds.

Thermaling

The Federal Aviation Administration's guidebook on gliding describes the following as it pertains to turns while thermaling:

Thermals tend to be smaller at lower levels and expand in size as they rise higher. Therefore, a steeper bank angle is required at lower altitudes, and shallower bank angles can often be used while climbing higher. Remain flexible with techniques throughout the flight. [...]

There are two other reasons to avoid thermaling speeds that are too slow: the risk of a stall and lack of controllability. [...]

Stall recovery should be second nature, so that if the signs of an imminent stall appear while thermaling, recovery is instinctive. Depending on the stall characteristics of the particular glider or in turbulent thermals, a spin entry is always possible. Glider pilots should carefully monitor speed and nose attitude at lower altitudes.⁴

Glider information

The Sportinè LAK-17B FES aircraft is a single-seat, flapped mid-wing glider with a T-tail, a retractable main landing gear, and 5 water ballast tanks. It is constructed of hybrid composite materials (Kevlar, carbon, and fibreglass). The glider also features a front-mounted electric sustainer motor whose battery pack is located behind the pilot.

⁴ Federal Aviation Administration, FAA-H-8083-13A, *Glider Flying Handbook* (2013), Chapter 10: Soaring Techniques, pp. 10-6 and 10-7.

The occurrence pilot had purchased the occurrence glider in the summer of 2023 and had it imported into Canada. Some minor maintenance required for the importation was completed in the summer of 2023. The glider remained in Invermere, British Columbia, until 4 days before the soaring competition.

A post-occurrence technical examination of the glider did not reveal any issues with its systems including the flight controls. The flaps were in the +3 position.⁵ The spring-tensioned elevator trimmer system for the control stick was in the aft/nose-up position, which is also common for thermaling. All water ballast tanks were empty.

Information collected during the investigation indicated that the pilot did not intend to use the sustainer motor during the competition. There was no damage to the propeller blades to indicate that they were rotating at the time of impact.

The aircraft was within the weight and centre of gravity limit envelope.

Pilot information

The pilot had a glider pilot licence and a valid Category 3 medical certificate at the time of the occurrence. He had been gliding for almost 30 years and had acquired approximately 750 flight hours on gliders. In addition, he had provided glider instruction at CEH2's Gliding Club.

In the 12 months leading up to the accident, the pilot had only conducted 5 flights. On 24 May 2024, the pilot conducted 2 flights with an instructor for an annual flight review in an Alexander Schleicher ASK 21 dual-seat glider. During these flights, stalls, spins, and steep turns were reviewed amongst other manoeuvres.

After the flight review, the pilot completed 3 flights in the occurrence glider: 2 flights on 27 May and 1 flight on 28 May. The total time for the 3 flights was 1.1 hours. The flight data recovered from the flight computer on board was reviewed. No information suggested that the pilot had performed any steep turns, stalls, or spins during those 3 flights. The occurrence flight was his 4th in the glider.

Parachute information

The TSB retrieved the parachute system⁶ and sent it to the Canadian Armed Forces Third Party Parachute Inspections group. Two Parachute Rigger Specialists conducted "a thorough and impartial technical inspection [of the parachute] to verify its serviceability and compliance with packing and maintenance standards as directed by the manufacturer. The assessment also reviewed adherence to Canadian and Federal parachute regulations."⁷

⁵ The aircraft flight manual recommends flap position +3 for landing, and +2 for thermaling. (Source: Sportine Aviacija ir Ko, *LAK 17B-FES Flight Manual* (19 April 2022), Section 4.5.3: Free flight, p. 4–9 Appr.).

⁶ The parachute harness and container are a Para-Phernalia Inc., SOFTI MINI, serial number 4890-5, manufactured in February 1998. The reserve parachute assembly is a 24-foot conical Free Flight Enterprises Inc. Preserve 1 Model FFE-201 (-C), serial number 62369, manufactured in January 1998.

⁷ Canadian Armed Forces Third Party Parachute Inspection report (13 September 2024), Section 3: Aim.

The report identified 2 issues pertaining to the date of the last repack and the overall age of the parachute. The last repack was 14 March 2023 and the next repack, due on 14 January 2024, had not been completed. The parachute assembly was 26 years old at the time of the occurrence, exceeding the parachute, harness, and container manufacturers' recommended service life of 20 years. It is important to note that the service life recommendation is advisory and the final determination of the parachute system's serviceability lies with the parachute rigger who packs and certifies its airworthiness.

The report concluded the following:

The complete parachute system encompassing the individual parachute, harness, and container system was deemed to be in serviceable condition other than the noted damage to the container system and cable housing. The observed damage is consistent with the type of damage that is typically observed from a significant impact with the ground.⁸

Using parachutes in emergencies

In general, parachuting (skydiving) is a complex activity that requires coordinated actions in extreme environments. Parachuting requires persistent and regular practice to mitigate the risks involved.

Parachuting from an aircraft unexpectedly as part of an emergency has many additional risks. For example, in an emergency, a pilot may bail out of an aircraft when it is not necessarily straight and level, in an uncontrolled trajectory, at an uncontrolled height, or in an uncontrolled environment; when they are unprepared; or while they are potentially suffering the effects of a debilitating stress response.⁹ However, while it may not be possible to mitigate all risks, periodic training is nonetheless beneficial. Specifically, it is important to emphasize that the regular practice of skydiving is key to increasing the chances of a successful bailout.

The pilot had practised egress from a glider but only when the glider was stationary on the ground. There was no record of the pilot having ever skydived.

Stress on human performance

Stress as it relates to pilot performance typically refers to acute stress where a particular stressor has triggered an emotional state of increased arousal that can impair performance on a particular task.^{10,11}

As workload and stress increase, cognitive capacity generally reduces. Specifically, working memory and attention are impacted. Stress is also associated with supplementary physiological

⁸ Ibid., Section 10: Summary.

⁹ M.E. Lewis, "Restraint systems and escape from aircraft," in *Ernsting's Aviation and Space Medicine*, Fifth Edition (2016), pp. 177–186.

¹⁰ C.D. Wickens, W.S. Helton, J.G. Hollands et al., *Engineering Psychology and Human Performance*, 5th edition (2022), p. 492–498.

¹¹ A. Landman, E.L. Groen, M.M.R. van Paassen et al., "Dealing With Unexpected Events on the Flight Deck: A Conceptual Model of Startle and Surprise," in *Human Factors*, Vol. 59, No. 8 (2017), pp. 1161–1172.

symptoms, such as an elevated heart rate, elevated blood pressure, increased perspiration, trembling, and sometimes the inability to control physical responses. In extreme stressful scenarios, otherwise very simple tasks can become impossible to perform.

One key stressor is that of surprise. Surprise is an emotional and cognitive response that is a result of a mismatch between what an individual was expecting versus what they perceive.^{12,13}

Stress can impact cognitive capacity and the ability to process information, which can be exacerbated by the physiological symptoms. Stress can also impact an individual's ability to manage a situation and to select and execute the correct course of action. This is especially the case during an emergency when an individual typically will be surprised and faced with time pressure and a potential or imminent threat to life. For this reason, it is important that an individual regularly practise an emergency task in order to become familiar with the scenario and perform "automatically," without unmanageable demands on their cognitive resources.

TSB laboratory reports

The TSB completed the following laboratory report in support of this investigation:

- LP098/2024 — NVM Data Recovery

Safety messages

Pilots are reminded that when using a safety system, such as an emergency parachute, being proficient in all aspects of its use is important to ensure its successful use.

Glider pilots are reminded that, when operating an unfamiliar aircraft, sufficient time should be given to learning the systems and emergency procedures. They should pay particular attention to the glider's flying characteristics (slow flight/stall/spin) before performing steep turns at low speeds (such as while thermaling) in demanding conditions and close to the ground.

This report concludes the Transportation Safety Board of Canada's investigation into this occurrence. The Board authorized the release of this report on 18 December 2024. It was officially released on 07 January 2025.

Visit the Transportation Safety Board of Canada's website (www.tsb.gc.ca) for information about the TSB and its products and services. You will also find the Watchlist, which identifies the key safety issues that need to be addressed to make Canada's transportation system even safer. In each case, the TSB has found that actions taken to date are inadequate, and that industry and regulators need to take additional concrete measures to eliminate the risks.

¹² Ibid.

¹³ European Aviation Safety Agency, NLR-CR-2018-242, *Startle Effect Management* (2018), at easa.europa.eu/en/document-library/research-reports/easarepresea20153 (last accessed on 18 November 2024).

ABOUT THIS INVESTIGATION REPORT

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Citation

Transportation Safety Board of Canada, *Air Transportation Safety Investigation Report A24W0059* (released 07 January 2025).

Transportation Safety Board of Canada
200 Promenade du Portage, 4th floor
Gatineau QC K1A 1K8
819-994-3741; 1-800-387-3557
www.tsb.gc.ca
communications@tsb.gc.ca

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Air transportation safety investigation report A24W0059

Cat. No. TU3-10/24-0059E-PDF
ISBN 978-0-660-74837-5

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