

ACCIDENT

Aircraft Type and Registration:	Zenair CH 601UL, G-CDAL	
No & Type of Engines:	1 Rotax 912-S piston engine	
Year of Manufacture:	2004 (Serial no: PFA 162A-14195)	
Date & Time (UTC):	1 August 2022 at 1050 hrs	
Location:	Field northwest of Kinglassie, near Fife Airport	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - None
Injuries:	Crew - 1 (Minor)	Passengers - N/A
Nature of Damage:	Significant damage to fuselage, wings, propeller, canopy, and undercarriage	
Commander's Licence:	National Private Pilot's Licence	
Commander's Age:	70 years	
Commander's Flying Experience:	828 hours (of which 45 were on type) Last 90 days - 18 hours Last 28 days - 5 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

Synopsis

The aircraft's canopy came open unexpectedly shortly after takeoff, causing significant handling difficulties for the pilot who elected to carry out an immediate forced landing ahead. During the landing ground roll the aircraft suffered significant damage due to a rapid deceleration caused by crops catching on the wings and undercarriage.

The pilot concluded that the most likely cause of the canopy opening in flight was an object fouling the right canopy latch mechanism when the canopy was closed for flight, thus leaving it insecure.

History of the flight

The accident occurred shortly after takeoff from Runway 24 at Fife Airport. Reflecting on the flight, the pilot recalled carrying out his normal routine of checking that both right ('passenger') and left ('pilot') sides of the canopy "were fully down and secure" immediately after it had been lowered. He also remembered checking canopy security during the pre-and after-start checks as well as immediately prior to lining up on the runway before starting his takeoff roll.

The takeoff proceeded normally until, as the aircraft climbed through approximately 100 - 150 ft, the right side of the canopy lifted up. Shortly afterwards, the pilot heard "an almighty bang" and a blast of air struck him, blowing off his headset. At the time, he

attributed the noise and increased airflow to the canopy having subsequently lifted on his side of the cockpit. The insecure canopy generated a significant amount of extra drag and the pilot had difficulty controlling the aircraft. He reduced power and landed ahead in a field of barley. The fully-grown crop caught the wings and undercarriage, causing a rapid deceleration and loss of directional control which resulted in significant damage to the aircraft (Figure 1).



Figure 1

G-CDAL after the accident, damage evident to wings, fuselage, and canopy

While the right side of the canopy transparency was largely intact, the left side was broken and a large section of it was missing (Figure 2).

In the aftermath of the landing, the pilot could not remember if he needed to unlock the left canopy latch before exiting the aircraft, or if it had been released during the accident sequence.



Figure 2

G-CDAL's broken canopy

Aircraft information

G-CDAL has a one-piece canopy, hinged at the front of the canopy frame. Independent latching mechanisms to secure the canopy for flight are located toward the rear of the canopy frame on each side of the cockpit. These latches engage automatically in corresponding spigots on the cockpit sills when the canopy is closed (Figure 3).



Figure 3

Latch components on canopy frame and cockpit sill

Handles located on each side of the canopy frame are connected to their respective latch mechanism and are used when exiting the aircraft to release the latches, thereby allowing the canopy to be opened (Figure 4).



Figure 4

Left side of canopy frame showing latch mechanism and operating handle

The pilot reported that, due to the spigot bracket design and the position of the seat back, it was not possible to visually check that the passenger side latch had correctly engaged around the spigot after closing the canopy on the accident flight. Nonetheless, he had physically checked that the canopy felt secure before departure.

Aircraft examination

A post-accident examination did not reveal faults with either latch mechanism but the left cockpit sill was distorted near the latch spigot bracket, as highlighted in Figure 5.



Figure 5
Left cockpit sill

During his post-accident inspection of the canopy mechanism, the pilot found that pushing up on the latch operating linkage (Figure 6) would release the catch independent of the canopy latch operating handle. He also determined that if the linkage was fouled while the canopy was being closed it could prevent the latch jaws from closing correctly around the spigot.

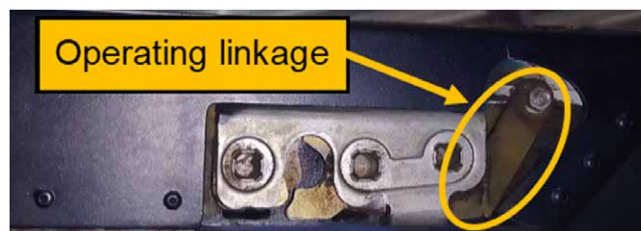


Figure 6
Latch operating linkage

Analysis

Having found no fault with the canopy latching mechanisms, the pilot concluded that the most likely cause of the accident was the right canopy latch not being fully engaged around its corresponding spigot thereby allowing the canopy to lift up as air loads increased. He surmised that the latch operating linkage had probably been fouled when the canopy was initially lowered, thus preventing the latch's jaws from closing correctly around the spigot.

Given the damage to the left cockpit sill, the pilot considered it possible that the loud bang and inrush of air could have resulted from the canopy fragmenting due to torsion as the right side of its frame lifted while the left latch remained engaged.

The pilot reflected that, if one had been available, a secondary canopy locking mechanism might have prevented the uncommanded canopy opening and subsequent accident.