



**Accident** to the JONKER JS1B  
registered **ZS-GDE**  
on 15 July 2022  
at Château-Arnoux - Saint-Auban (Alpes-de-Haute-Provence)

<b>Time</b>	Around 14:15 <sup>1</sup>
<b>Operator</b>	Centre National de Vol à Voile (CNVV)
<b>Type of flight</b>	Local
<b>Persons on board</b>	Pilot
<b>Consequences and damage</b>	Glider substantially damaged
This is a courtesy translation by the BEA of the Final Report on the Safety Investigation. As accurate as the translation may be, the original text in French is the work of reference.	

## Collision with trees on short final

### 1 HISTORY OF THE FLIGHT

*Note: the following information is principally based on statements and FLARM data from the glider retrieved by the BEA.*

The pilot took off at around 13:50 for a local flight to the west of Château-Arnoux - Saint-Auban aerodrome (Alpes-de-Haute-Provence).

After about 20 minutes of flight, finding no more lift, he decided to return to land at the aerodrome. From the moment the glider joined the circuit for runway 20 until the start of the final, the glider followed a standard flight path. At an altitude of 535 m, i.e. a height of 65 m, the final approach slope increased sharply. The pilot retracted the air brakes to reduce the rate of descent. Approximately 380 m from the runway threshold, the glider hit the top of the trees and then collided with the ground.

<sup>1</sup> Except where otherwise indicated, the times in this report are in local time.

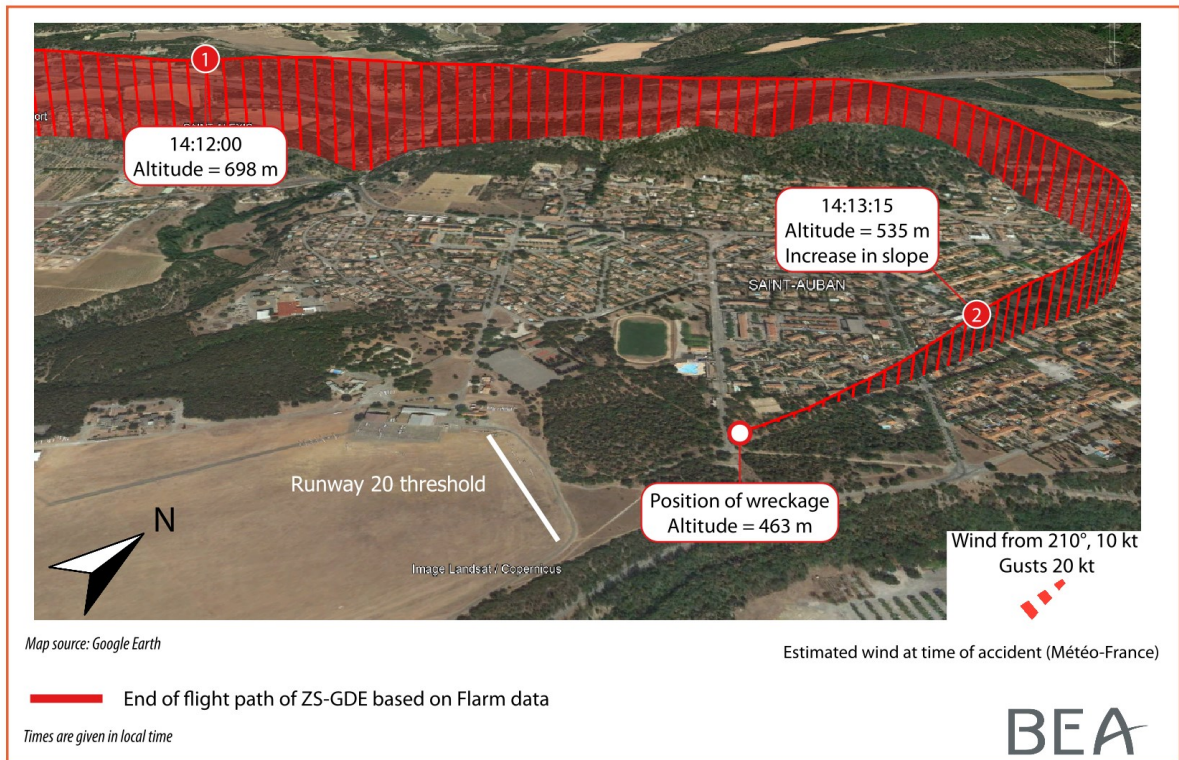


Figure 1: path based on FLARM

## 2 ADDITIONAL INFORMATION

### 2.1 Examination of site and wreckage

The glider wreckage was located on the side of a road about 350 m from the threshold of runway 20 at Château-Arnoux - Saint-Auban aerodrome.



Figure 2: accident site (Source: BEA)

Several tree branches severed by the glider were found on the ground over a distance of around 30 metres, along a path oriented 180°. The right wing struck the branch of a tree, tearing off the wing extension and causing the glider to spin and dive and then collide with the ground on its nose.

With the exception of the right wing extension, which was torn off when the glider hit a tree, the wreckage was complete and not dispersed. No structure technical failure prior to the collision with the ground was identified. The examination of the flight controls did not reveal any anomaly. All the failures observed were caused by the impact with the ground.

The trim was found in neutral position, the flap position indicator was found between positions 3 and 4, and the landing gear was extended. The air brake control was unlocked in the forward position (air brakes retracted).

## **2.2 Aerodrome information**

Château-Arnoux - Saint-Auban aerodrome is open to public air traffic. It has a grass surface used for take-offs and landings mainly along the 022° or 202° axes, although other axes can be used by based aircraft. Paved mini strips are reserved for based aircraft.

The chapter on air navigation hazards on the VAC chart mentions the existence of severe downdrafts in the presence of northerly winds.

<b>ATERRISSAGE A VUE</b> Visual landing		Ouvert à la CAP Public air traffic		<b>CHATEAU ARNOUX SAINT AUBAN</b> AD 2 LFMX ATT 01	
08 NOV 18					
				ALT AD : 1507 (54 hPa)	<b>LFMX</b>
				LAT : 44 03 31 N	VAR : 1°E (15)
				LONG : 005 59 27 E	

APP : NIL  
TWR : NIL  
AIA : 122.3

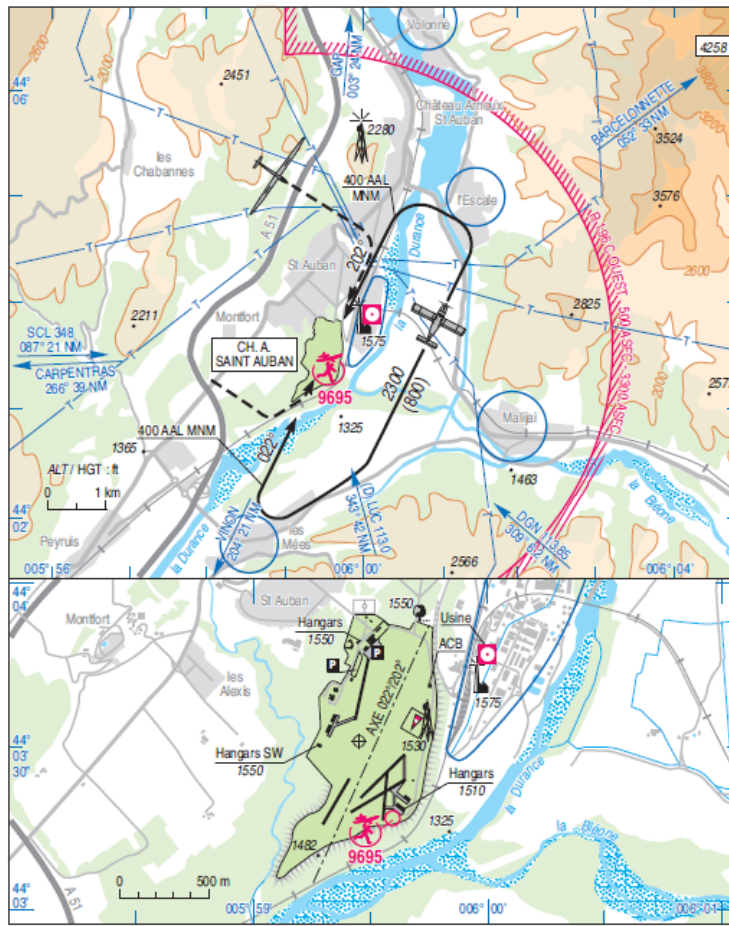


Figure 3: Château-Arnoux - Saint-Auban aerodrome VAC chart (Source: SIA)

### 2.3 Meteorological information

The weather conditions were as follows: wind from 210° of 10 kt gusting up to 20 kt, CAVOK, temperature 35 °C, dew point temperature 12 °C, QNH 1012 hPa.

The sun was roughly on the runway centreline and high in the sky: azimuth 200° and elevation 67°.

According to Météo-France, the high temperature was conducive to the formation of strong thermal lifts combined with the usual gusts associated with lifts in the valley. The data recorded by the automatic station located at Château-Arnoux - Saint-Auban aerodrome indicated that at 14:00 the average wind was blowing from the south-west, while the gusts were blowing from the north-west. This particular aerological condition was likely to temporarily increase turbulence on the ground.

## 2.4 Pilot experience

The 58-year-old pilot held a glider pilot licence along with associated aerotow launch, autonomous take-off and TMG<sup>2</sup> ratings. He had logged 944 flight hours, 41 hours of which in the previous three months and 29 hours in the previous month, five of which on type.

The pilot indicated that he adopted the same type of approach facing southwards for all landings carried out that week. He added that this was his third flight on this type of glider. He usually flew DG 400 and DG 500-type gliders.

## 2.5 Statements

### 2.5.1 ZS-GDE pilot

The pilot indicated that he was taking a week-long training course at the CNVV. He normally attended this type of course once a year. He remembered that the gliders were taken out at around 08:45 to take off facing southwards. Then, around midday, the wind changed direction and the gliders were positioned to take off facing northwards. Between 13:00 and 14:00, the wind changed direction again and the gliders were repositioned facing southwards.

After a towed take-off from runway 20, the pilot benefited from several lifts, but when there were no more lifts, he decided to return to land at Château-Arnoux - Saint-Auban. He specified that he completed the entire flight with the landing gear extended, only usually retracting it on reaching sufficient altitude. He joined the middle of the downwind leg then turned in base leg. He explained that he set the flaps to position 4 and only used the air brakes briefly. The approach seemed normal to him.

When he turned on final, he saw that gliders were on the runway. He decided to land shorter than usual, between the runway threshold and the gliders, but not too short so that the tug could get him back in the air quickly. He reported that the glider then began to descend sharply. In response, he retracted the air brakes but the glider continued to fall. He added that he did not have much time to react before the nose of the glider made contact with the top of the trees.

## 2.6 Glider information

The glider registered ZS-GDE was equipped with wingtip extensions to increase its wingspan to 18 m and thus its performance.

The flap and air brake controls are located on the left-hand side of the cockpit (see *Figure 4*).

The flap position is selected using the flap control (horizontal handle, black). Each flap position is held by a detent, and changing the position of the flaps requires the handle to be lowered slightly to release the detent, then moved forwards or backwards to reach the desired position. The handle then returns to the horizontal position, locking the flaps in place.

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<sup>2</sup> *Touring Motor Glider.*

The air brake control (vertical handle, blue) has only one locking notch corresponding to the forward position. To lock the air brakes in the retracted position or to unlock them, a force of 15 to 20 kg (forward or aft respectively) must be applied to move past this notch. During approach, the pilot constantly adjusts the position of the air brakes to maintain the path (forward to retract, aftward to extend).

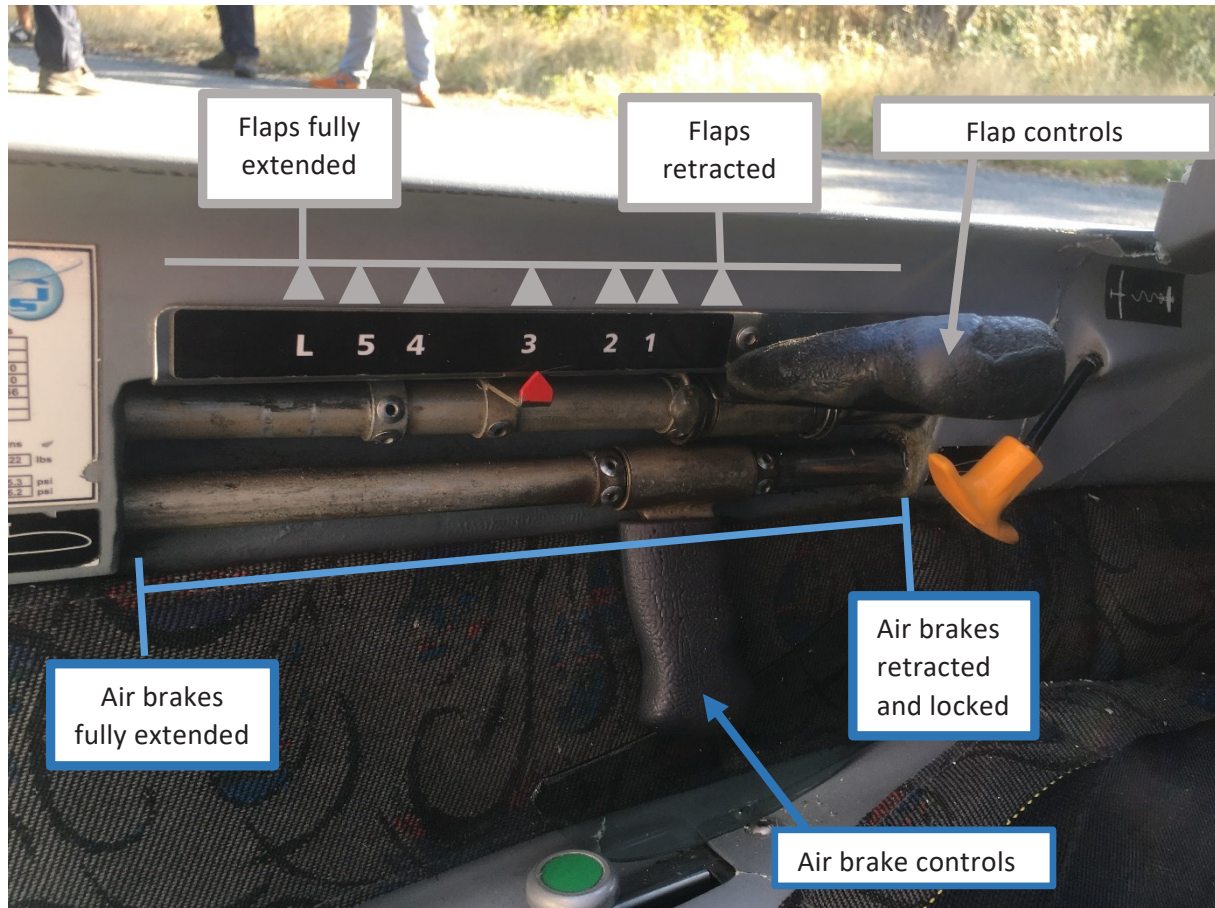


Figure 4: location of flap and air brake controls (Source: BEA)

The flight manual indicates that flap position 4 is optimal for normal thermalling and can also be used during the approach until landing. The best lift-to-drag ratio (maximum lift-to-drag ratio = 53) is obtained with the flaps in position 4. The manual provides a diagram for determining lift-to-drag ratio as a function of glider weight and speed. At an approach speed of 100 km/h, the lift-to-drag ratio is 52. With the air brakes fully extended at 117 km/h, the lift-to-drag ratio is around 7 and continues to decrease if the speed increases.

Lastly, the manual warns against reducing the flap extension angle during final approach when speed is not sufficient, as the associated reduction in lift would result in a marked loss of altitude.

## 2.7 Read-out of recorded data

The BEA retrieved the Open Glider Network (OGN) data for 23 gliders that landed facing southwards at the aerodrome before the accident.

The comparison of these paths with that of ZS-GDE did not reveal any anomalies either in terms of altitude in the downwind leg or in terms of following the final approach path to an altitude of 500 m. From this point onwards, the slope of ZS-GDE was steeper than that of the other finals.

Analysis of the final path of ZS-GDE showed that the glider initially followed an average glide path of around 13 % (i.e. an apparent lift-to-drag ratio of 7.7) with an average ground speed of around 95 km/h, compatible with a short landing. This data is consistent with a normal approach speed (around 100 km/h) and the use of air brakes. The glide path then increased to reach an average slope of almost 24 % (apparent lift-to-drag ratio of 4<sup>3</sup>) with an average ground speed of 92 km/h. At the end of the path, the glide path decreased and stabilised at a slope of around 10 %. A few seconds later, the ground speed fell sharply, probably corresponding to the glider's impact with the top of the first trees.

The paths followed by three gliders that landed facing southwards over the 15 minutes preceding the accident did not show any noticeable change in their slope during the final approach until landing.

### 3 CONCLUSIONS

*The conclusions are solely based on the information which came to the knowledge of the BEA during the investigation.*

#### Scenario

The glider was on the final approach path with an average slope of 13 % to land on runway 20 at Château-Arnoux - Saint-Auban aerodrome. On final at a height of around 65 m, the glide slope increased sharply to 24 % before stabilising again at around 10 %. The glider, which was low and below the approach path, collided with the top of the trees about 15 seconds later.

It is possible that an aerological phenomenon caused ZS-GDE to lose altitude on short final. Indeed, the weather conditions on the day of the accident, combined with the particular geographical environment to the north of the aerodrome, were conducive to the occurrence of turbulence and wind shears near the ground. The paths of the other gliders on final shortly before the accident were normal, so this phenomenon probably appeared suddenly and locally. It may have caused a sudden drop in the glider's true airspeed and angle of attack, resulting in a marked reduction in lift and a rapid loss of altitude. As the use of air brakes has little effect on speed, their retraction by the pilot did not reduce the rate of descent.

#### Safety lessons

##### Wind shear on short final

Wind shear is a rapid variation in wind speed or direction along the aircraft's path.

The direct consequence of this is to modify the intensity and direction of the relative wind, more specifically its orientation in relation to the aircraft centreline, and therefore the aircraft's true airspeed and angle of attack.

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<sup>3</sup> The minimum calculated lift-to-drag ratio on final on the previous flights recorded was 6.

To limit the effects of wind shear, the aircraft's speed should be increased to give a sufficient safety margin in relation to the stall speed.

This topic was already addressed in the BEA investigation report concerning [the accident to the Dyn'Aero MCR R-180 registered F-PFVV and to the Schempp Hirth Duo Discus registered F-CBEC on 30 June 2017 at Les Mées \(Alpes-de-Haute-Provence\)](#). Following this accident, the CNVV installed a fully autonomous weather station that measures wind strength and direction in real time, complementing the visual indications provided by the three windsocks. On the day of the accident, information on wind strength, direction and any gusts was provided by the starter to the pilot when he announced that he was joining the downwind leg.

*The BEA investigations are conducted with the sole objective of improving aviation safety and are not intended to apportion blame or liabilities.*