Accident to the SCHEMPP HIRTH - DUO DISCUS registered HB-3362 on 28 May 2019 at Vinon (Var)

Time | 14:22\(^{(1)}\)
Operator | Private
Type of flight | Local flight
Persons on board | Pilot and passenger
Consequences and damage | Glider severely damaged

This is a courtesy translation by the BEA of the Final Report on the Safety Investigation published in May 2020. As accurate as the translation may be, the original text in French is the work of reference.

Cartwheel during towed take-off run

1 - HISTORY OF THE FLIGHT

Note: the following information is based on statements and the data recorded by the glider’s on-board system.

The glider was lined up on the northern tug strip of unpaved runway 28 at Vinon aerodrome, behind the tug plane. The pilot, who was in the front seat, and the passenger signalled to the wing runner on the left side of the glider that they were ready to take off. The runner lifted the left wing, raised his arm to the tug pilot to signal that he could take off, and then accompanied the wing for about 10 metres\(^{(2)}\).

After a few metres of the take-off run, the left wing dropped a first time almost to the ground and then came back up, but not to the horizontal. Thereafter, the glider remained tilted to the left.

As the glider lifted up from the ground at an indicated airspeed of about 80 km/h, the right wing suddenly rose upwards and the left wing touched the runway. The pilot pulled on the tow cable release. The glider spun around its left wing, lifted up and fell back onto the runway. The tail broke off and the glider came to rest in the opposite direction to the take-off direction.

\(^{(1)}\) Unless otherwise stated, all times given in this report are in local time.

\(^{(2)}\) The wing runner keeps the wing level and runs beside the glider for the first few metres of the take-off run to keep the glider in its level flight position.
2 - ADDITIONAL INFORMATION

2.1 Site and aircraft examination

The marks on the runway, corresponding to the left wing tip dragging along the ground, located 10 m to the left of the centreline of the tug strip, start about 270 m from the threshold and are visible for several metres.

The average height of the grass on the runway is 25 cm and reaches, in places, about 45 cm at the edge of the tug strips (see photo Figure 1)(3).

Examinations of the release hooks and handles on both aircraft did not reveal any malfunction that could have contributed to the accident.

2.2 Glider information

The glider’s flight manual indicates that the maximum demonstrated crosswind component on take-off and landing is 20 km/h.

The glider is equipped with two tow cable release handles, one in the front and one in the rear seat, located respectively on the left near the stick and on the left at the top of the instrument panel. Pulling on one of these handles activates the hook and releases the tow cable. The flight manual states that to release the cable, the handle must be pulled on fully several times.

The glider had been rented for one week by the pilot and passenger from a Swiss gliding club based in Bern.

(3) The handbook for the operation of public general aviation aerodromes published by the DSAC recommends that aerodrome operators regularly mow a grass runway to limit the height of the grass cover to 5-10 cm, paying particular attention to this during the spring period.
2.3 Glider occupant information

2.3.1 Pilot

The pilot, who held a private pilot licence for sailplanes (SPL) issued by the Swiss authorities (FOCA(4)) in 2013, had logged 198 flight hours, including three in the previous three months and 16 on type. She had logged 250 glider take-offs, including nine towed take-offs in the previous twelve months. She was applying the training taught in Switzerland, which consists of being ready to immediately pull the release handle without necessarily holding it in your hand.

2.3.2 Passenger

The passenger had held a private pilot licence for gliders since 1998 and a glider instructor rating. He had logged 1,077 flight hours and about four hours, all on type, in the previous three months. He declared that he had logged 400 flight hours on type.

2.4 Meteorological conditions

The occupants of the glider, along with other pilots, attended the safety briefing given by the chief pilot in the morning.

The meteorological conditions estimated by Météo-France at the time of the accident were as follows: visibility greater than 10 km, a few clouds at 1,900 m and broken clouds at around 5,000 m, moderate to severe turbulence between the ground and 1,700 to 2,000 m altitude.

At the time of the accident, the data recorded by the meteorological station located at the aerodrome indicated an average wind of 37 km/h (20 kt), direction 320°, variable in direction up to 350° with gusts instantaneously reaching 63 km/h (34 kt).

Several witnesses present at the aerodrome at the time of take-off confirmed that the windsock indicated a wind of 300° and around 20 knots. A photograph taken six minutes after the accident shows the windsock almost in a horizontal position.

The aerological conditions may have contributed to the right wing lift despite the correction made by the pilot. The crosswind component was most likely close to or instantaneously exceeded the maximum demonstrated crosswind component for take-off of the glider.

2.5 Read-out of computers

The data from the glider’s LX8080 computer, which comprised a FLARM module, was downloaded and the glider’s ground trajectory was extracted (see Figure 2).
2.6 Statements

2.6.1 Wing runner

This function was performed by the gliding club’s chief pilot, who also performed the starter function using a portable VHF radio. He indicated that, during the take-off run, the wind was 310° and 20 knots with small gusts. He explained that he ran 5 to 10 m holding the wing until it lifted and, when he released it, it was in a horizontal position. He indicated that he saw the left wing drop a few metres further on. According to him, the centreline hold was good but, given the low wing, there was a need (although not an urgency) to take action on the controls to bring the wings back to a level attitude. The left wing then rose slightly to about 30 cm from the ground only, dropped a second time and touched the ground.

2.6.2 Glider pilot

She explained that it was her first flight at the aerodrome. During the take-off run, she was holding the stick with her right hand and her left hand was on her thigh. When the left wing touched the grass and the right wing lifted up, she pulled the release handle with her left hand. She confirmed that the cable was released without difficulty. She stated that she was not aware of the directive of the FFVP(5) relating to holding the release handle (see paragraph 2.10 below). She added that there was no particular problem with the flight controls and that the wind direction was 300° and the wind speed 20 kt.

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(5) Fédération française de vol en planeur (French Gliding Federation).
2.6.3 Glider passenger

He said that there was a strong wind from the right at an angle of between 20° and 30° to the take-off alignment. He indicated that the glider shifted slightly to the left during the take-off run. He was aware of the FFVP directive and explained that he was not holding the release handle because it is not recommended in Switzerland. Furthermore, because this was not a training flight and he trusted the pilot’s flying abilities, he did not have his hands on the controls. He indicated that he had grasped the stick and the release handle when the left wing touched the grass, but that it was already too late.

2.6.4 Tug plane pilot

The pilot of the tug plane indicated that, at the time of take-off, the average wind he observed on the windsock was about 20 knots with a 30° divergence in respect of the runway centreline.

2.7 Crosswind towing technique

The tug pilot’s handbook prepared by the FFVP recalls that the tug pilot, before undertaking cross-wind tows, must check the cross-wind certification limits of the aircraft being towed.

At the beginning of the run, control of the glider’s bank was complicated by the combined effects of the wind and the aircraft’s jet blast. Despite the pilot’s corrective actions, it is possible that a wing may touch the ground and remain there. The risk of a ground loop or cartwheel is high in such a case. If this occurs and the glider pilot does not immediately take the initiative to release the glider, the tug pilot must release the glider himself.

2.8 Towed glider take-off technique

The Glider Pilot’s Manual (14th edition) explains that as soon as the wing runner has released the wing, the wings-level attitude must be maintained by the pilot even if this entails significant lateral input on the stick. If, despite this, one of the two wing tips touches the ground, the pilot must apply significant stick and rudder input to return to zero tilt and maintain take-off alignment. If the wing tip touches the ground and is not immediately raised, release the glider and brake. This is why the pilot’s left hand must be preventively placed on the yellow handle during take-off.

2.9 Cartwheel

In 2013, in the wake of a number of winch-launch accidents, the FFVP issued a “Flash Sécurité et Formation” [Safety and Training News Flash][6] in order to standardise winch launch procedures in France. The provisions adopted in this document are based on the conclusions of a study[7] launched in 2006 by the British Gliding Association (BGA) following an upsurge in winch launch accidents or incidents in England.
Excerpt from “Flash Sécurité et Formation” D13_5525 of 19 September 2013

A. Immediately applicable provisions:

1/ Concerning the risk of cartwheeling on take-off when the wing touches the ground, we shall adopt the procedure used by the BGA [...] This consists of holding the release handle firmly during the winch launch.

Explanation

The required reaction time is about 0.5 seconds and therefore does not allow you to have your hand anywhere but on the handle. This procedure should be taught by clubs without delay. When a wing touches the ground on take-off, release must take place immediately. Our European friends require that the release be effective before the wing touches the ground, otherwise ground loop is inevitable.

Instructors[^8] (as well as other pilots) are strongly advised to undertake self training using the online documents available on the BGA website.

Since 2013, the BEA has identified seven accidents during glider take-offs that culminated in a cartwheel phenomenon or the initiation of such a phenomenon. Four occurred during towed take-offs and three occurred during winch launches. Two of these accidents resulted in fatal injuries[^9]. In both cases, the cable was not released by the glider pilots. The first, in 2013, occurred during a winch launch. It led to the FFVP’s recommendation. The second occurred the following year during a towed take-off. The investigation concluded that the pilot probably did not have his hand on the release handle.

It has been shown that cartwheels do not occur only during winch launches. They can also occur in towed take-offs, especially in strong winds. Once lateral control of the glider is obtained, it is possible to release the yellow handle. The FFVP therefore recommends holding the yellow handle firmly during the start of the take-off run, both for winch launches and towed take-offs[^10]. It can therefore be released as soon as roll control of the glider is obtained.

In a video on the cartwheel[^11] filmed in 2019 by the DSAC[^12] at the request of the FFVP, it is recalled that the release handle must be grasped by the pilot just before tensioning of the cable, both for winch launches and towed take-offs. This recommendation now appears at the bottom of the back of the “CRIS” pre-take-off vital actions checklist, which is the standard checklist for all clubs that are members of the FFVP (see Figure 3).
In Switzerland, responsibility for the training programme and the rules to be followed has been transferred to the Swiss Gliding Federation. The president of this federation explained that it is recommended in the training programme, both for winch launches and towed take-offs and to avoid an untimely release, that the pilot should be ready to pull the release handle immediately without necessarily holding it in his hand. The Swiss-trained pilot followed this recommendation.

### 3 - LESSONS AND CONCLUSION

The glider’s towed take-off was conducted with a significant crosswind component and in gusty conditions. During the take-off run, the right wing rose up once and the pilot corrected this using stick and rudder inputs, but did not manage to bring the wing back to a perfectly level attitude. As the glider lifted off the ground, the right wing rose up once again, probably under the effect of a gust of wind, and the left wing tip touched the runway.

The pilot likely had difficulty controlling the glider during rotation in the face of a gusty crosswind. By the time she had pulled the release handle, it was too late to prevent the glider from cartwheeling.
The following factors may have contributed to the loss of control of the aircraft during the take-off run:

- The pilot of the tug plane and the pilot of the glider gave insufficient consideration to the possibility of the glider’s maximum demonstrated crosswind component being exceeded during the take-off run. The investigation could not determine whether the pilot applied sufficient input on the aileron control to counter the crosswind and keep the wings level.
- The take-off was performed on a runway that had tall grass in certain places, which could have destabilised the glider during the take-off run.
- The late decision to release the cable even though roll control of the glider had not been ensured during the take-off run.