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SAFETY INVESTIGATION REPORT

Accident to the SCHLEICHER ASK21 registered F-CHIN on Monday 10 April 2023 at Sarreguemines - Neunkirch

Time	Around 16:40[1]
Operator	Aéroclub de Sarreguemines
Type of flight	Instruction
Persons on board	Instructor and pilot in instruction
Consequences and damage	Pilot seriously injured, 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.	

Cable release during a towed take-off, attempted U-turn, stall then collision with ground, in instruction

1 HISTORY OF THE FLIGHT

Note: the following information is principally based on statements and data from the glider's FLARM.

The instructor, sat in the rear seat, and the pilot in instruction, undertook an instruction flight in the scope of a start-of-the-season day organised by the flying club. The glider was lined up around 70 m before the threshold of the glider grass runway 23R[2] at Sarreguemines - Neunkirch aerodrome. The flaps of the tug plane were in the take-off position.

During the take-off run, mid-runway, when the glider had already taken off, the tug pilot observed that he had not reached his rotation speed and asked for the cable to be released. The instructor who had the glider controls for the take-off[3], released the cable and turned left at low height in order to land on the reciprocal QFU[4] of aeroplane runway 05R. During the turn, the glider stalled, the left wing and then the nose of the glider came into contact with the ground and the tail boom ruptured. The glider came to a halt on the aeroplane runway.

[1] Except where otherwise indicated, the times in this report are in local time.
[2] See paragraph 2.9.
[3] See paragraph 2.3.1.
[4] The glossary of abbreviations and acronyms frequently used by the BEA can be found on its web site.

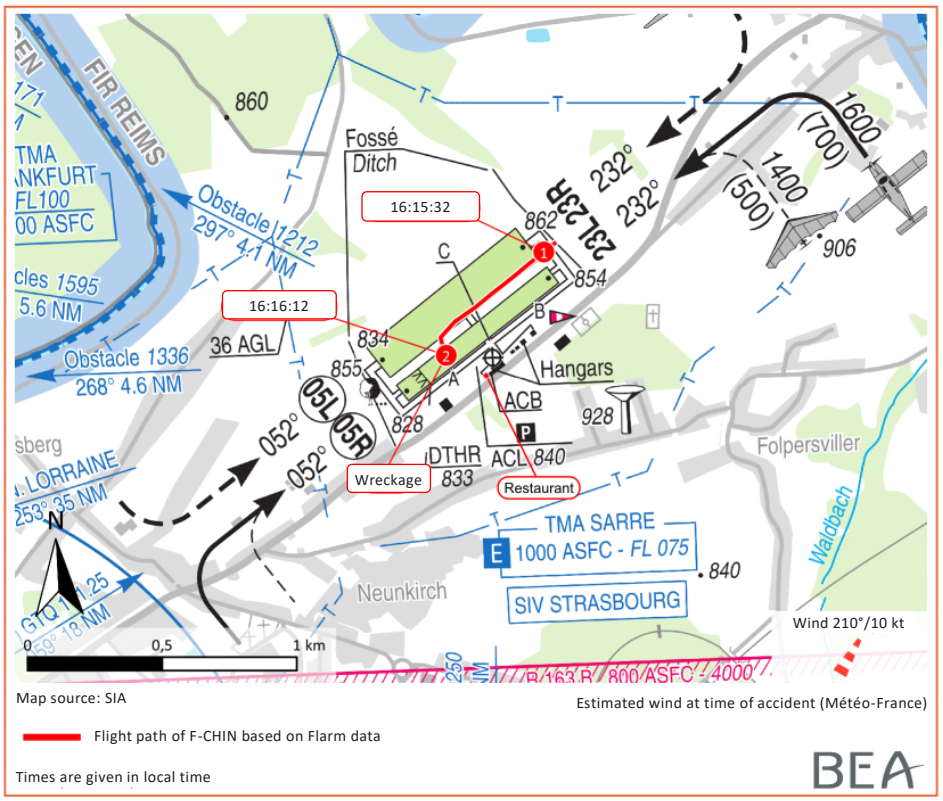

Figure 1: flight path of F-CHIN

2 ADDITIONAL INFORMATION

2.1 Site and wreckage information

Figure 2: wreckage of glider F-CHIN (source: GTA)

The glider came to a stop with the forward section of the fuselage facing north-west. The tail boom had completely ruptured and separated from the main fuselage. The BEA did not carry out an examination of the wreckage.

2.2 Persons on board information

2.2.1 Instructor information

The 70-year-old instructor held an aeroplane private pilot licence obtained in 1971 accompanied by a towing rating also obtained in 1971 and a sailplane private pilot licence obtained in 1969. He also held a sailplane flight instructor rating obtained in 2015. At the time of the accident, he had logged approximately 1,810 glider hours including 550 hours in instruction.

2.2.2 Tug pilot information

The 68-year-old tug pilot held an aeroplane private pilot licence obtained in 1972 accompanied by a towing rating also obtained in 1972 and a sailplane private pilot licence obtained in 1971 along with a sailplane instructor rating obtained in 1980. He had logged 504 aeroplane flight hours including 210 hours in towing flight and more than 8,200 sailplane flight hours.

Before the club purchased the tug plane registered F-HIGM, he had flown on this aeroplane several times on cross-country flights out of Heppenheim aerodrome in Germany.

2.2.3 Pilot in instruction information

The 51-year-old pilot in instruction held a sailplane pilot licence (SPL) obtained on 24 November 2020. He had logged around 51 glider flight hours.

He stated that he had not touched the controls during the accident flight.

2.3 Statements

2.3.1 Statement by glider F-CHIN instructor

The instructor indicated that he had carried out a first instruction flight with another pilot on F-CHIN in the beginning of the afternoon. For this flight, he had been towed by the Morane Saulnier MS893 “Rallye” which is the aeroplane usually used by the club for towing.

He added that due to a battery failure on the Rallye, the decision was taken to use the DR400-180 registered F-HIGM that the club had recently acquired. As the on-duty tug pilot had not been approved for this aeroplane, the subsequent towing operations had to be carried out by another member of the flying club, approved for the DR400-180.

The accident flight was, for the club, the first time a two-seater glider was to be towed with a DR400-180 from this aerodrome. The pilots of the ASK21 and the tug pilot therefore carried out a quick briefing during which they agreed that the cable would be released by the glider pilots at the tug pilot’s request if there was a problem gaining speed for the take-off.

The instructor was sat in the rear seat and proposed taking the controls for the take-off and handing them over to the pilot in instruction during the initial climb.

The instructor indicated that the glider took off at 90 km/h before arriving level with the restaurant which is used as the mid-runway reference by the flying club pilots. He then let the stick move forward to allow the tug plane to gain speed. At that moment, the tug pilot asked the glider pilots over the radio, if they had taken off and then without waiting for their reply, he asked them to release the cable.

He added that the pilot sat in the front seat was tall and obstructed his forward field of vision, preventing him from seeing the tug plane and the runway.

He specified that at that time, he did not know how many metres of runway remained ahead of him and if the tug plane had taken off. Furthermore, he feared that on landing on the runway ahead of him, that he would either strike the tug plane on the runway if the latter had chosen to reject its take-off, or run over the end of the runway and strike the ditch located just after the runway end.

He indicated that he instinctively started a LH turn to land on the reciprocal QFU of the aeroplane runway parallel to the glider runway. He specified that the ground of the glider runway was not compact and that its RH side was muddy in places and overgrown with brambles, whereas the more commonly used aeroplane runway had a more stable surface. He estimated that the glider was at a height of 10 m at the time of the turn.

He felt the glider stall during the turn, when he entered crosswind conditions, estimating the crosswind at between 10 and 15 km/h.

2.3.2 Statement by tug plane F-HIGM pilot

The tug pilot stated that he was present at the aerodrome but that he had not planned to fly and that he was not on-duty for towing operations.

He indicated that he did not complete a weight and balance sheet nor did he calculate performance. Neither did he install the rear view mirror on the aeroplane, to save time. He indicated that he was also preoccupied with his other duties within the club.

He stated that he applied full power and did not identify any engine malfunction or warning during the take-off. When passing level with the restaurant, the usual reference for the flying club pilots to carry out the rotation with the Rallye, he observed that his speed was only 90 km/h instead of the expected 115 km/h. He then asked for the cable to be released and continued his take-off.

He explained that he knew the Rallye better than the DR400 in this type of operation. He believed that the lack of take-off performance at the time of the occurrence could be explained by the condition of the runway, considered “sticky” just like every spring, and the grass not being mown before the day of the flights.

2.4 Glider information

The ASK21 is a two-seater glider with a maximum weight of 600 kg. The glider's estimated take-off weight was 582 kg.

According to the ASK21 flight manual, during a towed take-off, the glider leaves the ground at a speed of 75 km/h and its stall speed is 74 km/h.

The data recorded by the FLARM shows that at the time of the turn, the height of the glider was around 10 m and its ground speed, calculated by the BEA, was around 80 km/h. It then had around 240 m of runway ahead of it. The distance to the ditch was around 290 m.

2.5 Tug plane information

The DR400-180, registered F-HIGM, is equipped with a 180-hp Lycoming O-360 engine. It had been purchased by the flying club around seven months before the occurrence. It had previously been used solely for towing (around 2,500 hours) by the German club from which it was purchased. After being purchased by Aéroclub de Sarreguemines, it was used by the flying club's aeroplane pilots for local and cross-country flights. It had not been used for towing out of Sarreguemines before the day of the accident.

The tug plane's estimated take-off weight was 795 kg. According to the DR400-180 flight manual, the maximum take-off weight is 850 kg for a towing flight with a 600 kg glider.

It is equipped with a Sensenich 76-58 propeller, which is compatible with glider towing operations according to the DR400-180 flight manual supplement.

The pilot of the tug plane indicated that F-HIGM could be fitted with an exterior rear-view mirror and that this had been removed to limit drag during cross-country flights[5].

F-HIGM is equipped with a FLARM, as required by the FFVP, but it was not up to date and was not activated on the day of the accident.

2.6 Meteorological information

The meteorological conditions estimated by Météo-France on Sarreguemines - Neunkirch aerodrome at the time of the accident were the following:

- wind from 210°, 10 kt;
- CAVOK;
- temperature 16°C and dew point temperature 5°C;
- QNH 1017 hPa.

2.7 Flight preparation

Prior to the accident flight, to prepare the first time that the DR400-18 was going to tow a two-seater glider, the tug pilot carried out the following actions:

- towed a lighter single-seater glider earlier in the day;
- positioned the glider F-CHIN and the tug plane before the runway threshold[6];

[5] The use of a rear view mirror when towing is not compulsory under the regulations, but it is considered essential by the FFVP, which recommends the installation of an exterior rear view mirror (see *Guide pratique du pilote remorqueur, edition 2, 2019*).

[6] The glider's FLARM data showed that it was positioned approximately 70 m before the threshold of runway 23R. As the length of the tow cable was 60 m, the DR400 tug plane probably started its run about 10 m before the runway threshold.

- agreed with the glider instructor and the pilot in instruction that the instructor would release the cable on take-off in the event of a problem with the tug plane gaining speed.

2.8 Documents and instructions associated with towing operations

The *Guide pratique du pilote remorqueur* provides recommendations for tug pilots. In the scope of threat and error management (TEM), the FFVP recommends that during the briefing, the tug pilot identifies the threats and implements preventive measures. In particular, in the event of the towing operation being rejected, the guide specifies that the rejection flight paths of the tug plane and the glider must have been the subject of analysis and local instructions drawn up, which must be perfectly familiar to the pilots in the tug-glider combination.

No specific instructions relating to glider towing with F-HIGM were formalised by the flying club following its acquisition. More generally, the club had not issued any emergency instructions in the event of a cable release during take-off and the pilots were not aware of any pre-determined flight paths that were to be adopted.

Fields had been identified by the club for emergency landings and their location is mentioned during pilot training. It is estimated that these fields can only be reached from a height of 100 m; the glider had not reached this height during its take-off before the accident.

2.9 Aerodrome information

The aerodrome has two parallel unpaved runways:

- an aeroplane runway 05R/23L, measuring 714 m long and 80 m wide;
- a glider runway 05L/23R, measuring 714 m long and 150 m wide.

The aerodrome's VAC chart indicated that there was a ditch shortly after the end of runway 23 and a tree of a height of around seven metres.

The two pilots explained that the RH part of glider runway 23 was damper, and had molehills, vegetation (brambles) and holes.

2.10 Operational performance

The take-off distance available (TODA) for runway 23R is 714 m and the distance between the threshold of runway 23 and the restaurant, established by the flying club as the reference for the rotation with the Rallye, is approximately 410 m.

According to the tug pilot, the aeroplane's speed as it passed this reference was 90 km/h. According to the DR400-180 flight manual, the recommended rotation speed is 115 km/h.

The take-off run distance and the take-off distance for a DR400-180 towing on a grass runway were calculated by the BEA using data from the DR400-180 flight manual, at the aerodrome's altitude and at the day's temperature, with no wind. Two corrections described below were then applied to take account of the runway condition and the headwind.

The practical guide for tug pilots mentions the increases to be applied to take-off distances in the case of soft or muddy ground. The FFVP indicates that these increases are also applicable in the

case of a "sticky" runway, as was the case for runway 23R[7]. The guide does not directly specify the increase to be applied between a grass runway and a muddy runway. Based on the other values indicated, the BEA considered that this increase was around 15%[8].

The DR400-180 flight manual also states that a 10 kt headwind reduces take-off distances by 15%.

The distances thus calculated were approximately:

- take-off run distance (in m): 400;
- take-off run distance (in m): 650.

3 CONCLUSIONS

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

Scenario

The flying club, *Aéroclub de Sarreguemines* organised an instruction day for licensed glider pilots in anticipation of the new season. As the Rallye usually used by the club was no longer available after the first towing operation, the flying club pilots decided to use the DR400-180 registered F-HIGM, acquired a few months previously, to carry out the subsequent towing operations. The pilot of the Rallye was not approved for the DR400, so another member of the flying club offered to carry out the tow flights.

Given that the DR400-180 had never been used for towing by the club out of this aerodrome, a lighter, single-seater glider was towed first, shortly before the accident flight, without incident. The second towing operation was with F-CHIN. It was the first time that the club had towed a two-seater glider with a DR400-180 out of this aerodrome. In order to take into account this risk, the pilots discussed the possibility of releasing the cable if there was a problem with gaining speed and it was decided that the instructor would have the glider controls for the take-off. However, the flight paths to be followed by the tug plane and the glider in the event of a rejected take-off were not discussed.

The tug pilot did not install the rear view mirror on the aeroplane, in order to, according to him, save time and he did not calculate performance.

During the take-off run, the tug plane did not manage to reach a sufficient speed on arriving level with the reference that the pilot usually used with the Rallye. As the tug pilot did not have a rear view mirror, he did not know at this point, whether the glider had taken off and asked the instructor to release the cable. The instructor released the cable and then, as he did not have visibility ahead of him, turned left at a height of around 10 m to land on the reciprocal QFU on aeroplane runway 05R. The glider stalled during the turn and then collided with the ground.

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[7] However, these increases are generic orders of magnitude and do not necessarily correspond to the actual condition of runway 23R and its influence on performance on the day of the accident.

[8] The guide states that the take-off performances mentioned in most flight manuals are valid for the use of paved runways. Take-off distances should be increased by : 10% on grass runways, 25% on tall grass, 25% on soft ground, mud or snow. By deduction, the BEA considered that the increase to be applied between a muddy runway and a grass runway was 1.25/1.1, i.e. 14%. As these are orders of magnitude, the BEA took 15% for the calculation.

Contributing factors

The following g factors may have contributed to the rejected towed take-off and to the glider stalling after releasing the cable:

- no prior definition of the flight paths or instructions within the club in the event of a cable release during a rejected take off;
- insufficient preparation of this flight which was the flying club's first towed take-off of a two-seater glider out of this aerodrome with a DR400-180;
- this first towed flight being carried out with a glider flown from the rear seat, reducing the forward visibility for the pilot with the controls;
- a U-turn being carried out at a low height and low speed.

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