State Commission on Aircraft Accidents Investigation

FINAL REPORT

2023-0053

OCCURRENCE NUMBER

ACCIDENT

GTOW: Glider towing related events
LOC-I: Loss of control – in flight

The sole purpose of both the investigation and the Final Report is to prevent aviation accidents and incidents.

The Commission does not apportion blame or liability The investigation is independent and distinct from any judicial or administrative proceedings.

Any use of this Report for any purpose other than prevention of air accidents and incidents may lead to wrong conclusions and interpretations.

Private

MDM-1 M FOX, SP-8000

Toruń aerodrome (EPTO), 4 August 2023

This Final Report was issued by the State Commission on Aircraft Accidents Investigation (PKBWL) on the basis of information available on the date of its publication.

This Report presents the circumstances of the aviation occurrence concerned, as well as its causes, contributing factors and safety recommendations.

This Report was drawn up in Polish.

Warsaw, 5 june 2024

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INTRODUCTION

LEGAL GROUNDS

The State Commission on Aircraft Accidents Investigation (PKBWL) is a safety investigation authority referred to in Article 4(1) of Regulation (EU) No 996/2010 of 20 October 2010 on the investigation and prevention of accidents and incidents in civil aviation and repealing Directive 94/56/EC (Official Journal of the European Union L 295, 12.11.2010, p. 35, as amended).

The Commission conducts safety investigations pursuant to the provisions of the Aviation Law of 3 July 2002 (Journal of Laws No 130 of 2002, item 1112, as amended) and the European Union law on accidents and incidents in civil aviation, taking into account the standards and recommended practices laid down in Annex 13 to the Convention on International Civil Aviation made in Chicago on 7 December 1944 (Journal of Laws of 1959, item 212, as amended).

KEY INFORMATION ON THE OCCURRENCE

Operator (user), flight number or type – Private.

Manufacturer, type, model and registration marks of the aircraft –MDM-1 M FOX, SP-8000.
Place and date of the occurrence –Toruń aerodrome (EPTO), 4 August 2023

OCCURRENCE REPORT

PKBWL was notified of the occurrence under the mandatory reporting system on 4 August 2023.

The occurrence was assigned the reference number –2023-0053.

Based on initial information, the occurrence was classified as an accident.

The classification was not changed in the course of the investigation.

OCCURRENCE NOTIFICATION

PKBWL was notified of the occurrence by the organiser of the contest.

ORGANISATION OF THE INVESTIGATION

The investigation was conducted by – PKBWL.

Investigator-in-Charge (IIC) – Jacek Bogatko.

Specialist groups – no specialist groups were appointed.

RECOMMENDATIONS

Unless otherwise specified, the recommendations contained in this Report are addressed to the regulatory authorities of the State concerned. The decision on how to proceed is the responsibility of those authorities. Details are provided in Chapter 4 of this Report.

TIME

Time in the Report is provided as LMT. LMT on the occurrence day = UTC+2.

DATE

Where a date is provided in this Report in a digital format, the respective digits represent DD/MM/YYYY, where DD means day, MM means month, and YYYY means year.

FIGURES AND TABLES

Unless otherwise specified in this Report, the PKBWL is the source.

SYNOPSIS

On 4 August 2023, the Toruń aerodrome (EPTO) hosted the fourth event in the World Advanced Glider Aerobatic Championships. At 18:28 hrs another competitor took off for his flight. After releasing the tow line, the glider pilot turned the flight path to the left in the direction of the axis of the aerobatics zone. After starting a sequence, performing the first figure, the glider flew into the tow line attached to the aeroplane. The line blocked the glider's elevator. The pilot carried out an emergency parachute jump.

During the occurrence, the glider pilot did not sustain any injuries, the glider was destroyed, and the tow plane was slightly damaged.

SYMBOLS, ACRONYMS AND ABBREVIATIONS

SYMBOLS

°	degree e.g. °C (temperature) and 1° (angle)
'	minute
"	second

ACRONYMS AND ABBREVIATIONS

	A
AMSL	Above Mean Sea Level
	C
C	degree Celsius
CPL	Commercial Pilot Licence
	E
E	East / eastern longitude
	F
FI	Flight Instructor
FE	Flight Examiner
ft	foot/feet
FAI	Fédération Aéronautique Internationale
	H
h	hour(s)
HMD	Height Measuring Device
Hz	Hertz (cycle per second)
	K
kg	kilogram(s)

FD	Flights Director
km	kilometre(s)
km/h	kilometres per hour
kt	knot(s)
	M
m	metre(s)
MHz	Megahertz
min	minute(s)
m/s	metre(s) per second
	N
N	North / northern latitude
	S
s	second(s)
SEP(L)	Single Engine Piston (Land)
A/C	aircraft
	T
TMG	Touring Motor Glider rating
	V
VFR	Visual Flight Rules
	W
W	West / western longitude
WGAC	FAI World Glider Aerobatic Championships
WAGAC	FAI World Advanced Glider Aerobatic Championships

1. FACTUAL INFORMATION

1.1. History of the flight

On 4 August 2023, the Toruń aerodrome (EPTO) hosted the fourth event in the World Advanced Glider Aerobatic Championships. A pre-contest briefing was held before the start of the flights. The briefing reiterated the radio frequencies on which radio correspondence was to be maintained and discussed organisation of the aerodrome traffic pattern (Fig. 1).

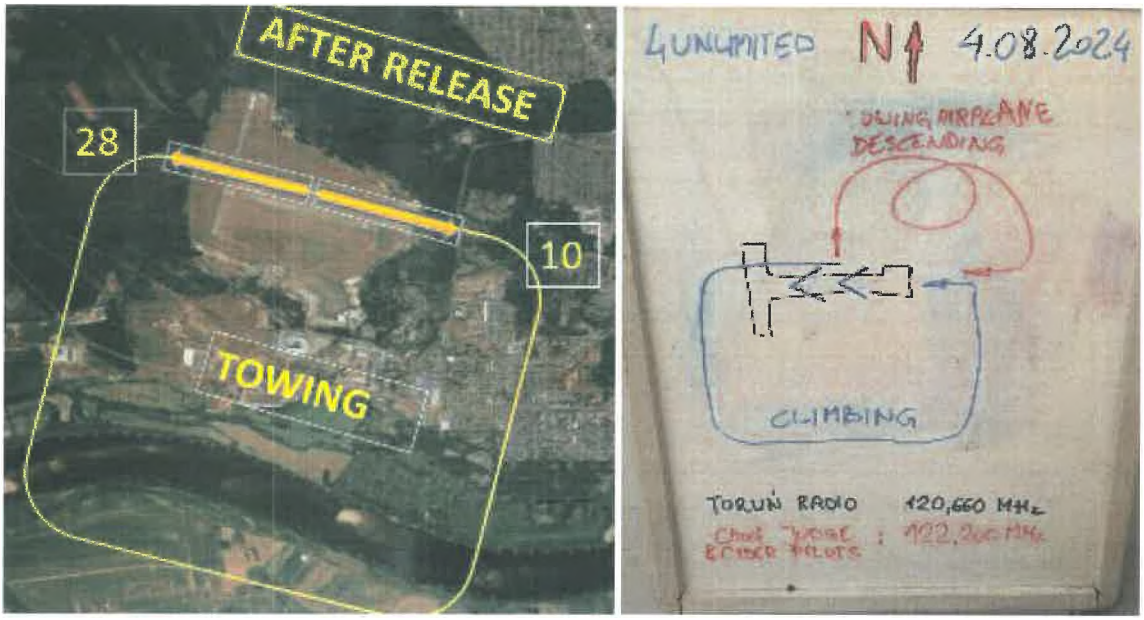


Fig. 1. The structure of the aerodrome traffic pattern organisation presented at the pre-flight briefing (left) and displayed in the glider take-off point (right)
[source: the organiser of the contest]

The competitors were informed about the direction of the main axis in the zone (direction 28) along which sequences were to be performed, and were briefed on the weather forecast.

According to an account by the tow plane pilot, it was agreed at the briefing that the aeroplane-glider team would to enter the zone at the height of 4000 ft AGL (around 1220) in the westerly direction. At that height the glider pilot was to release the line. After the release, the tow plane pilot was to take a 90° right turn immediately (change the heading to the northerly one) and commence descent as soon as possible, leaving the zone.

At 18:28 hrs another competitor took off for his flight. Before the entry into the zone, the tow plane pilot established the wind correction angle and maintained the heading at around 250°. Before the entry into the zone, at the height of around 1200 m, the aeroplane pilot called (on the radio) the Flights Director (FD) and

received clearance to enter the zone. At the same time, the glider pilot received the "box free" message on the chief contest judge's frequency. By banking the glider from wing to wing energetically, the pilot controlled his position relative to the zone axis so as to release at the right time. After the release, which was confirmed by the FD on the radio, the aeroplane pilot maintained the pre-agreed flight altitude and heading for around 10 s (Fig. 2).

Figure 2. The position of the aeroplane at 6 s after the glider release [source: the pilot's camera]

A video footage recorded by a camera installed in the SoloFox cabin showed that after the release the glider pilot turned the flight path to the right, in the direction of the zone axis. After the release, he checked the space below him and the glider's position in the zone, but he did not monitor the position of the tow plane. Before starting a sequence, the pilot dipped the wings to indicate that he was beginning the sequence, and 16 s after the release, while executing the first figure (at the height of 1150 m), he caught (with the right wing) on the tow line which was attached to the tow plane descending after the release (Fig. 3). The aeroplane and the glider flew past each other at a small distance.

Figure 3. The aeroplane in descent 16 s after the glider release. [source: the organiser's camera and the pilot's camera]

The end of the tow line with the attachment ring coiled around the glider's tail, became jammed in the slit between the right wing and the fuselage, blocking the elevator in the full down position (Fig. 4). There was a strong jerk, after which the safety device installed on the line was torn off, and the aeroplane's heading changed suddenly right by around 30°.

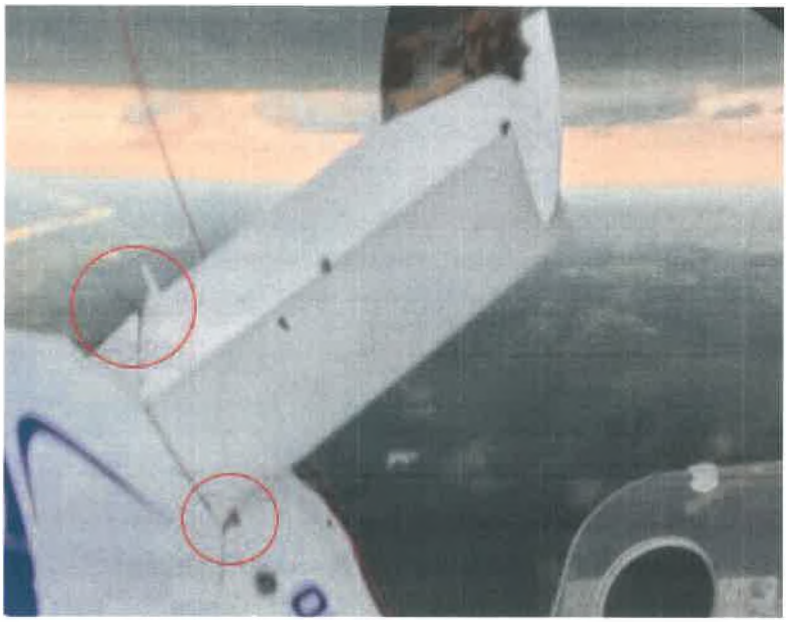


Figure 4. A view of the elevator blocked by the tow line. [source: a camera installed on the cabin fairing]

The glider made a right turn by around 180° in inverted flight, ¼ barrel roll, and during a transition into a dive (at the height of 1080 m) the glider pilot jettisoned the cabin fairing, unbuckled the safety belts and made an emergency parachute jump (Figure 5). He landed on the north-eastern part of the aerodrome.

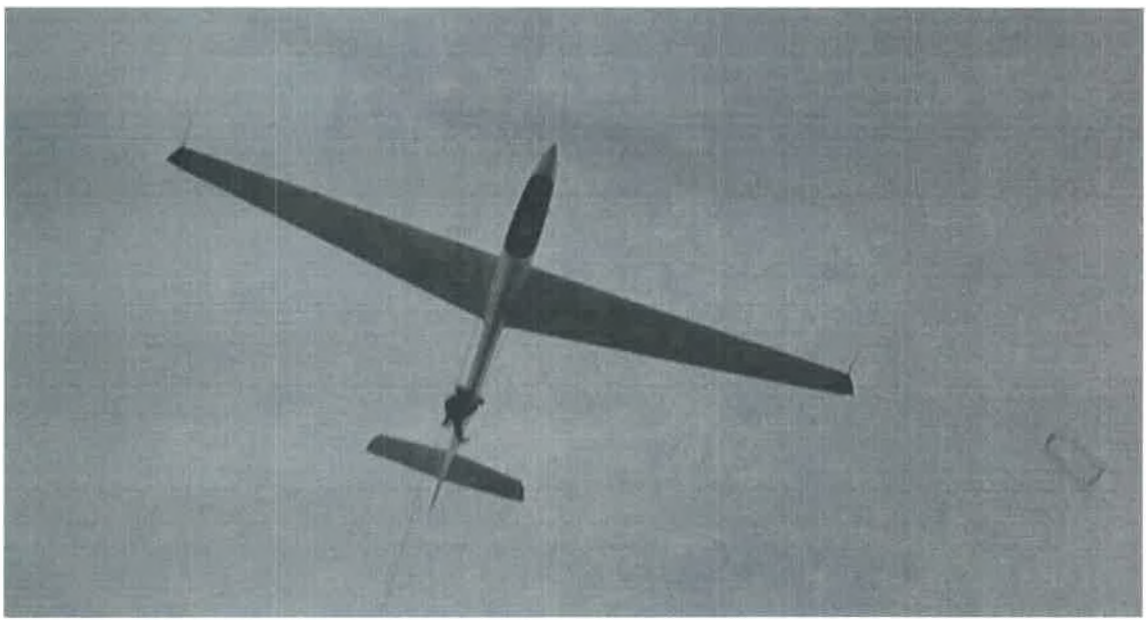


Figure 5. Emergency parachute jump by the glider pilot [source: the organiser's camera]

The glider descended in the inverted position and fell on the aerodrome premises in the south-eastern part of the aerodrome.

None of the pilots sustained any injuries during the occurrence.

As a result of the occurrence, the glider was destroyed and the tow plane was slightly damaged.

1.2. Injuries to persons

Table 1. General summary of the number of injuries

Injuries	Glider/aeroplane crew	Passengers	Total in the aircraft	Others
Fatal				
Serious				
Minor				
None	1/1		1/1	
TOTAL	1/1	Not applicable	1/1	None.

1.3. Damage to aircraft

The glider was destroyed as a result of the collision with the ground (Fig. 6).

Figure 6. The glider after the accident [source: Michał Klimaszewski]

1.4. Other damage

The tow hook mounting on the aeroplane's tail was deformed (Fig. 7).

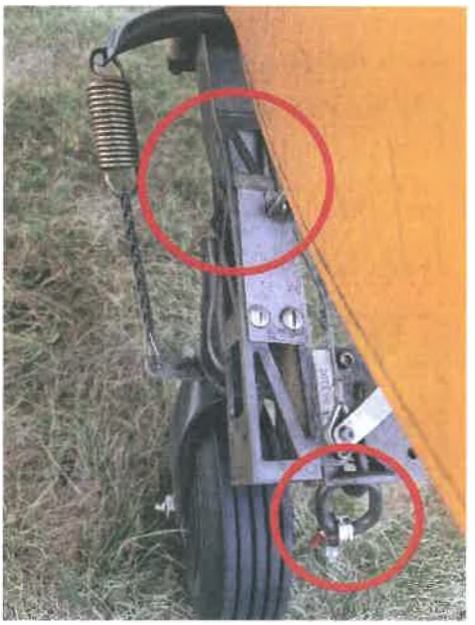


Figure 7. The deformed tow hook mounting and torn off safety device are marked with red circles

1.5. Personnel information

1.5.1. Pilot-in-Command

Pilot: male, aged 74.

Licence: IT.SFCL – sailplane pilot licence.

Ratings endorsed in the licence:

- Aerobatic Rating;
- Aero tow;
- TMG;
- Winch launch;
- FI;
- FE.

Licence: PPL(A) – private pilot licence (aeroplanes)

Ratings endorsed in the licence:

- sailplane towing rating;
- SEP(L);

– TMG.

Overall flight time: 15,574 h 25 min, of which on gliders: 11,482 h 43 min in 34,092 flights.

Flight time before the occurrence:

– within last 24 h: 0 h;
– within last 7 days: 30 minutes in the Solo Fox glider;
– within last 90 days: no data available.

Aero-medical certificate – Class 2 with VNL[1], valid until 27 February 2024.

Rest during last 48 h – the pilot was provided with an opportunity to rest in hotel conditions.

Pilot's familiarity with the aerodrome and experience – as part of training before the contest at the Toruń aerodrome, the pilot performed 15 flights lasting 3 h 58 min.

1.5.2. Tow plane pilot

Pilot: male, aged 58.

Licence: CPL(A) – commercial pilot licence (aeroplanes).

Ratings endorsed in the licence:

– SEP(L) valid until 31 August 2024;
– sailplane towing;
– banner towing;
– aerobatics.

Overall flight time: 943 h 46 min, of which 690 h 16 min as PIC.

Type flight time: Carbon Cub 5 h 47 min, of which 4 h 47 min as PIC.

Flight time before the occurrence:

– within last 24 h: 2 h 38 min in the Carbon Cub aeroplane;
– within last 7 days: 6 h;
– within last 90 days: 6 h.

[1] The medical limitation code which means correction for near vision.

Line check – successfully passed the Operator Proficiency Check, conducted on 28 May 2023.

Aero-medical certificate – Class I with VNL, valid until 19 July 2024.

Rest during the last 48 h – the pilot was provided with an opportunity to rest in home conditions.

Pilot's experience in aerodrome flights – high

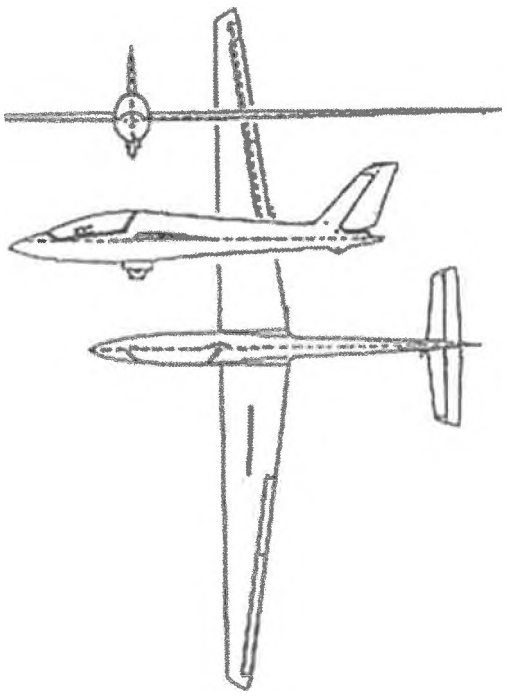
Position occupied in the cockpit and duties performed during the occurrence – the pilot occupied the front seat (single-person crew) and maintained radio correspondence.

1.6. Aircraft information

1.6.1. Airworthiness and maintenance

a) General information:

- The MDM-1M SoloFox special category glider is a single-seater modification of the MDM-1 Fox serial aerobatic glider equipped with a retractable landing gear.



One such aircraft has been built. Form many years it has been used for the purposes of training and competition at World Championship level contests in glider aerobatics.

- Manufacturer – ZRiPSL Edward Margański;

- manufacturer designation (model) – MDM-1M Fox;
- serial number – P-11;
- year of manufacture – 1993;
- registration marks – SP-8000;
- owner – private individual;
- user – private individual;
- Certificate of Registration – date of entry 12 July 1993 – valid as of the day of the occurrence;
- permission to fly in the special category issued on 22 November 2022, without limitations – valid as of the day of the occurrence.

b) History of the aircraft:

- total time since new – 1,306 hours 48 minutes;
- time since overhaul – 223 h 35 min;
- time since last maintenance (tow hook maintenance) – 25 h 40 min;
- modifications – none;
- Aircraft Technical Log – duly kept;
- maintenance documentation – the Aircraft Technical Log contains entries which include information on the work performed.

The glider had a valid third-party liability insurance.

1.7. Meteorological information

In the glider pilot's assessment, the weather was good.

Before the take-off for the competition, each glider pilot was shown a board with the wind speed and direction.

The meteorological diagrams of 4 August 2023 are presented below.

(Fig. 8).

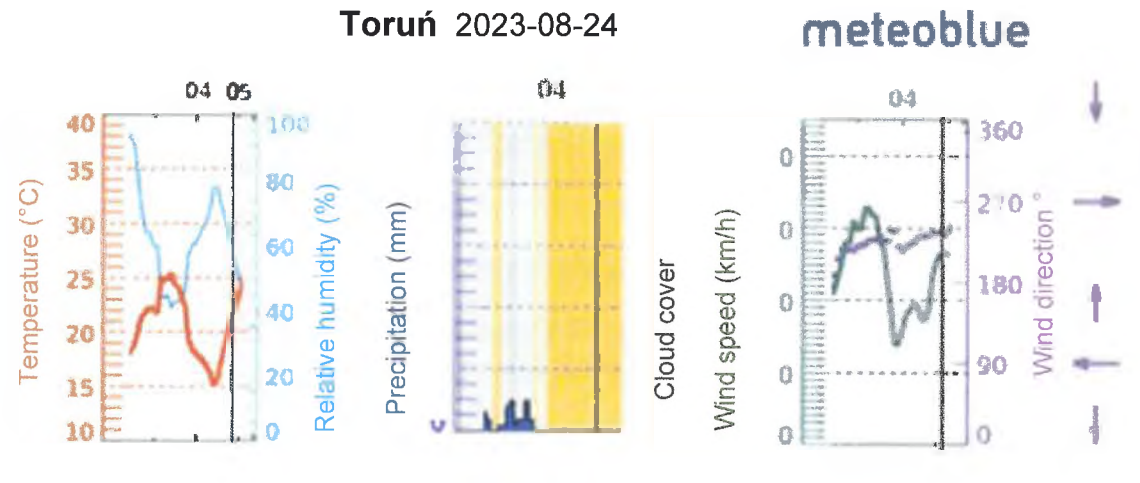


Figure 8.The weather forecast for the accident site on 4 August 2023.

1.8. Aids to navigation

Not applicable.

1.9. Communications

During the contest, radio communications was maintained and radio correspondence was exchanged on two frequencies:

- Toruń Radio 120.660 MHz;
- chief contest judge & glider pilot 122.200 MHz.

The frequency for Toruń Radio was used for correspondence with inbound traffic and tow plane pilots (confirmation of glider release in the zone).

The frequency for the chief contest judge & glider pilot was used for informing the competitors that the zone was free, which meant that the previous competitor had completed their sequence and left the zone.

1.10. Aerodrome information.

Toruń aerodrome – EPTO (Fig. 9);

- coordinates – 53°01'45.16"N, 018°32'45.22"E;
- aerodrome elevation – 50 m AMSL;
- radio frequency – 120.660 MHz.

Runways:

- 10R / 28L – 1269 x 57 concrete;
- 10L / 28R – 1092 x 100 grass.

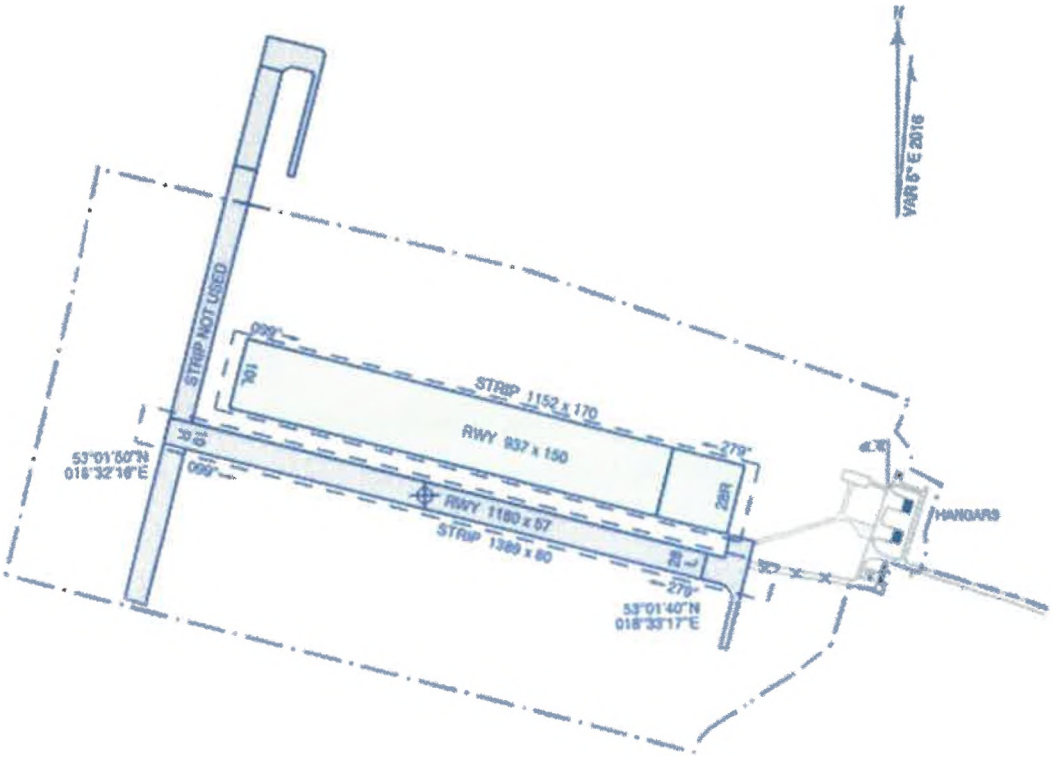


Figure 9.Diagram of the aerodrome [source: AIP Poland]

1.11. Flight recorders

A/C without flight recorders.

1.12. Wreckage and impact information

The tow line was 50 m long. The glider caught on it with its right wing. The length of the line that had got behind the wing moved along the fuselage to the rear, on the vertical stabiliser to the horizontal stabiliser, slipped into the slit between the rudder and the fuselage, and proceeded the left side of the fuselage. Subsequently, the end of the line bearing attachment ring, coming from the underside of the stabiliser, caught on the slit between the halves of the elevator. When the line tightened, the elevator was fully deflected down, and the tight line slipped into the slit of the fuselage-wing connection and got stuck. Following this, the safety device installed on the tow line on the aeroplane side was torn off. While the glider was falling, after the pilot egressed the cabin, the line wrapped around the fuselage (Fig. 10).

Figure 10. The wreckage of the glider with the tow line visible
[source: Michał Klimaszewski]

The jerk on the aeroplane's tail, when the tow line was getting tightened and the safety device cracked, caused damage to the truss on which the tow hook was mounted.

1.13. Medical and pathological information

The pilots did not sustain any injuries during the occurrence.

After the occurrence, the pilots were tested for the presence of alcohol in exhaled air, and the result was negative.

1.14. Fire

No fire occurred.

1.15. Survival aspects

The glider pilot wore properly fastened safety belts. After the elevator got jammed, the pilot jettisoned the cabin fairing, unbuckled the safety belts and deployed the emergency parachute after moving away from the falling glider. He landed on the north-eastern part of the aerodrome. As soon as the pilot landed, he was approached by an ambulance which was on standby at the take-off point as part of the medical support for the contest. The pilot was examined and after a 30-minute observation, he was found not to have sustained any injuries and was allowed to go to the hotel. The police and firefighters also arrived at the place of the occurrence shortly.

1.16. Tests and research

The Commission did not order any tests or research to be carried out by external entities.

1.17. Organisational and management information

The 2023 FAI World Glider Aerobatic Championships (WGAC) and the 2023 13th FAI World Advanced Glider Aerobatic Championships (WAGAC) were organised by the Pomerania Aero Club, a member of the Aero Club of Poland.

The 2023 WGAC and WAGAC were held in accordance with the following rules:

- Standardised European Rules of the Air (SERA);
- FAI Sporting Code – General Part;
- FAI Sporting Code, Section 6 – Part 2;
- FAI Anti-Doping Rules;
- Applicable local regulations.

English was the official language and the language of communication during the 2023 WGAC and WAGAC.

1.18. Additional information

A Flights Director has been appointed for the competition. The release of the tow line from the gliders was acknowledged by observers designated by the FD.

During the contest, the competitors flew without height measuring devices (HMDs). The tow planes entered the zone at the height of around 1,200 m above aerodrome level.

In accordance with Article 16(4) of Regulation (EU) No 996/2010 of the European Parliament and of the Council of 20 October 2010 on the investigation and prevention of accidents and incidents in civil aviation and repealing Directive 94/56/EC the parties submitted comments on the text of the Draft Final Report. The comments have beeb partly included in the text.

1.19. Useful or effective investigation techniques

Standard investigation techniques were applied.

2. ANALYSIS

2.1. General

2.1.1. Brief introduction

During the fourth event of the World Advanced Glider Aerobatic Championships held in Toruń, the Solo Fox glider collided with the tow line attached to a tow plane. As a result of the collision, the glider's elevator was jammed and the pilot made an emergency parachute jump.

The pilot did not sustain any injuries and the glider was destroyed.

2.2. Flight operations

2.2.1. Weather

The weather had no impact on the occurrence.

2.2.2. Operational procedures

The sporting code introduced the use of height measuring devices (HMDs) during contests at the international level. The use of HMDs allows for conducting towing operations to heights greater than the upper limit of the zone (1,200 m). Therefore, the glider pilot has more time after the release to begin a sequence and can adjust the position of their glider in the zone. The system also plays an important role also from a safety point of view. It gives the tow plane pilot more time to leave the zone. When the HMD stops emitting a sound signal, the glider pilot can execute their sequence and is not given penalty points for beginning it above the upper limit of the zone.

During the contest concerned, the competitors did not use HMDs. At the pre-contest briefing, it was agreed that the gliders would be towed to the height of 1,200 m, and entry into the zone would take place 1000 m before the zone and along the main axis. The lower limit for executing sequences was set at 200 m and was assessed visually.

Such a manner of holding the event meant that after the glider release, the competitors had no time to adjust their position in the zone and tried to begin their sequences as soon as possible, so as to minimise the loss of height beginning it.

According to the statement of the flights director, the Advanced programme took place after the end of flights in the Unlimited programme. In his assessment, it was probable that the order of flights in that class could not have ended before sunset.

As he stated, when he noticed that the glider had changed its heading to the right, he acknowledged the release to the aeroplane pilot on the radio. Once he made sure that the glider had been released, he assumed that the tow plane pilot would observe the agreed procedure and stopped monitoring the flight of the aeroplane and glider. Due to the time deficit, he shifted his attention to the team that was in the process of tightening the tow line.

2.2.3. Analysis of the flight

At the pre-flight briefing, it was agreed that the to plane pilot:

- after being cleared to enter the zone, should tow the glider along the direction of its main axis;
- after the release of the glider, should turn north and commence descent in order to leave the zone as quickly as possible;
- was to continue the descent outside the zone on the northerly circuit.

According to the statement of the aeroplane pilot, he had been towing the glider to the zone at the height of 4,000 ft (1,220 m) with a wind correction angle with heading 250°, i.e; at an angle of around 30° to the main axis.

The glider pilot corrected the direction of flight to a direction in line with the zone axis, i.e. 280°, after releasing. Starting the sequence on the 250° direction in which the glider was towed would have attracted penalty points for performing the figure with a deviation from the zone axis.

The final phase of the tow into the zone and the realising of the glider is shown in time-lapse images from the video recorded by the camera mounted in the glider's cockpit (Fig. 11). As can be seen, the aircraft was moving away from the zone axis to the left, in a southerly direction.

The yellow line shows the direction of the main zone axis. Photo 4 shows the moment when the glider pilot performed realeasing, and photo 5 shows the correction of the flight dirction to the zone axis.

Figure 11. Time-lapse photographs of the final phase of the glider's towing and releasing [source: pilot's camera].

A sketch showing the approximate course of the incident was made on the basis of the video recorded by the camera in the glider's cabin (Figure12).

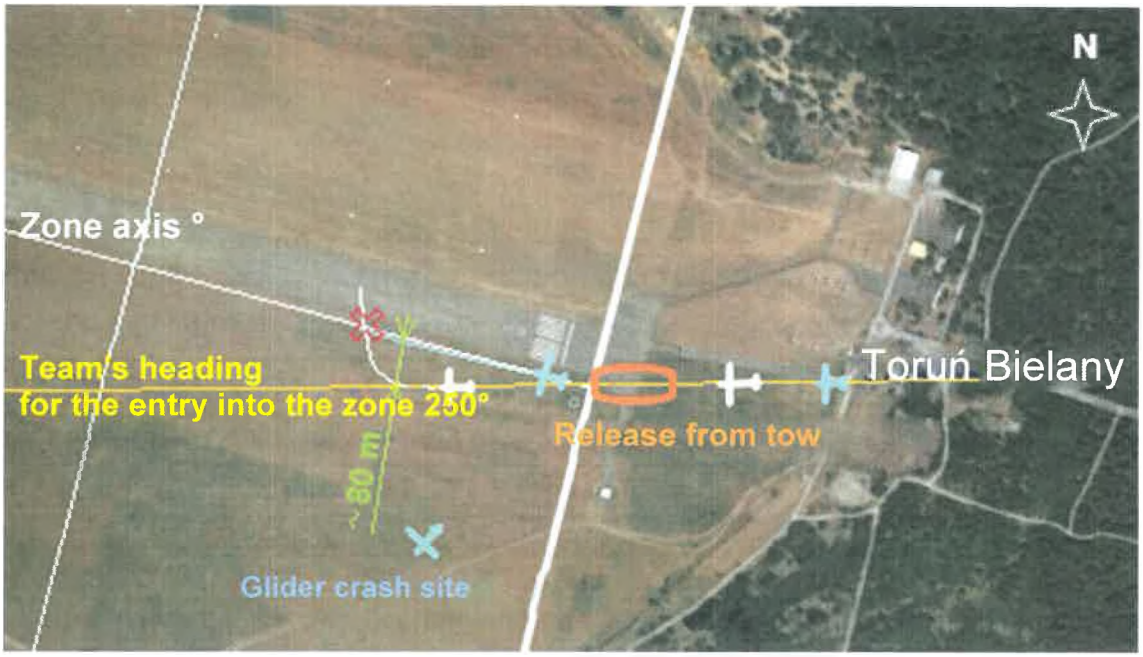


Figure 12. A sketch of the occurrence. [source: Geoportal/PKBWL]

After the release of the glider, the aeroplane pilot maintained the heading and agreed flight altitude, despite receiving an acknowledgement from the ground that the glider had released the tow line. The pilot did not turn right immediately to leave the zone as fast as possible. It was inconsistent with the earlier arrangements. During that time, the aeroplane flew at the speed of 70 kt, covered the distance of around 360 m, flying away from the glider and the zone axis to the left (in the southerly direction – Fig. 2).

The glider pilot could have subconsciously interpreted such a situation to assume that the aeroplane pilot had been cleared to descend on the southerly circuit, and that he could begin his sequence safely. He had free space in the direction in which he was beginning his sequence (Fig. 12). It must be noted that an aerobatic flight during a contest is always accompanied by strong pressure relating to the desire to get the highest score possible. The pilot focuses on performing their task, and it is the responsibility ofthe organiser to ensure free space for safe execution of a sequence.

Figure 13. Beginning of the sequence [source: the pilot's camera]

As transpires from the statement by the aeroplane pilot, before the release he saw in his rear view mirror that the glider was "veering off" slightly to the left. The aeroplane pilot was not aware that after the release the glider pilot corrected the heading to the right on the direction of the zone axis. After around 10 s, he turned right, reduced engine throttle and commenced descent while increasing the airspeed to 90 kt in order to leave the zone.

Such a behaviour of the aeroplane pilot put him on a collision course with the glider.

Before beginning his sequence, the glider pilot received a message from the chief contest judge that the zone was free ("box free"), which meant that the previous competitor had completed their sequence and left the zone. From that moment on, he focused on aligning his position relative to the zone axis, rather than on monitoring whether the tow plane had already left it.

The glider pilot released the tow line when the glider found itself more or less in the zone axis. Banking the glider to the right wing, the pilot adjusted the heading to the zone axis, checked his position in the zone and whether the zone below and ahead of him was free.

By lowering the wings, the pilot signalled to the judges that he was about to begin the sequence. After beginning the sequence, he was focused on correct execution of the first figure (Fig. 13), which started with a slow roll. Therefore, he no longer monitored whether the zone was free.

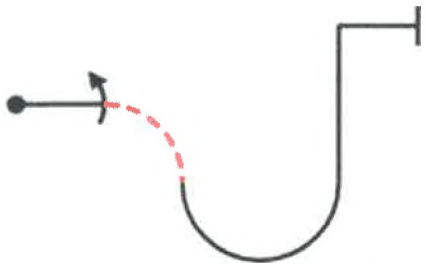


Figure 14. The first figure of the fourth programme

While executing the roll, the glider flew with its right wing in the tow line of the tow plane which was flying ahead of it in a descending turn in the northerly direction.

The organiser's last barrier that ensures the safety of aerobatic flights is the chief contest judge, who maintains communication with the glider pilot and is in a position to give binding instructions. As a rule, the judge informs the competitor that the previous competitor has completed their sequence and left the zone, but in special cases he can also decide to abort the task (the "break, break, break" message), e.g. when an unauthorised aircraft encroaches the aerobatic zone or any other hazard appears. During execution of aerobatics, monitoring of the zone occupancy is practically impossible. It is likely that in the case concerned the competitor began the sequence and the tow plane pilot executed a collision manoeuvre practically at the same time, which prevented any reaction by the chief contest judge.

3. CONCLUSIONS

3.1. Findings

3.1.1. The flight was performed as part of the World Advanced Glider Aerobatic Championships held at the Toruń aerodrome.

3.1.2. Both the aeroplane pilot and the glider pilot held qualifications necessary to perform the flight.

3.1.3. Neither the glider pilot nor the tow plane pilot was under the influence of alcohol.

3.1.4. The weather had no impact on the occurrence.

3.1.5. Before take-off for the competition, each glider pilot was shown an information board with the wind speed and direction and the cloud base height.

3.1.6. Both aircraft had valid technical documents and had been maintained in accordance with the rules.

3.1.7. Both aircraft were serviceable and airworthy.

3.1.8. The glider pilot wore properly fastened safety belts.

3.1.9. The glider had a valid third-party liability insurance.

3.1.10. During the contest, radio communication was maintained and exchanged on two frequencies.

3.1.11. During the contest, the competitors did not use height measuring devices (HMDs), and therefore, after the release, they tried to begin their sequence as soon as possible so as to minimise the loss of height before beginning it.

3.1.12. At the pre-flight briefing, the pattern of glider towing to the zone and the manner of leaving the zone by the tow plane were agreed upon.

3.1.13. A Flights Director was appointed for the competition.

3.1.14. The release of the tow line from the gliders was acknowledged by the observers and communicated by radio to the tow plane pilot.

3.1.15. The Flights Director did not monitor the flight of the aeroplane and glider after the release.

3.1.16. The tow plane pilot did not comply with the traffic pattern presented at the pre-flight briefing.

3.1.17. Before beginning the sequence, the glider pilot did not make sure that the tow plane had left the zone.

3.1.18. The aeroplane and the glider flew past each other at a small distance.

3.1.19. The glider flew with its right wing in the tow line, which coiled around the horizontal stabiliser and jammed the elevator.

3.1.20. The glider pilot carried out an emergency parachute jump.

3.1.21. None of the pilots sustained any injuries during the occurrence.

3.1.22. As a result of the occurrence, the glider was destroyed and the tow plane was slightly damaged.

3.1.23. The tow plane arrived at the aerodrome without any consequences.

3.2. Causes and contributing factors

3.2.1. The tow plane pilot did not comply with the traffic pattern presented at the pre-flight briefing.

3.2.2. The Flights Director did not monitor the flight of the aeroplane and glider after the release of the tow line.

3.2.3. The absence of height measuring devices and the decision to tow the gliders without any height reserve, as a result of which the pilots tried to begin their sequences as soon as possible after the release.

3.2.4. Before beginning his sequence, the glider pilot did not notice that the tow plane occupies the zone, and the chief contest judge did not manage to give a warning message in time.

4. SAFETY RECOMMENDATIONS

None.