AIR ACCIDENTS INVESTIGATION
INSTITUTE
Beranových 130
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FINAL REPORT

Investigation into the accident
-
collision of LAK 12,
registration OK-1212
with a tow rope
suspended from the Rallye 180T-D registration D-ESKH
at 3 km NNE LKHS
on 14 August 2013

Prague
August 2013

Abbreviations used

AAII	Air Accidents Investigation Institute of the Czech Republic
AFIS	Aerodrome flight information service
AGL	Above ground level
AMSL	Above mean sea level
ARP	Aerodrome reference point
ATZ	Aerodrome traffic zone
°C	Temperature in degrees C
CU	Cumulus
E	East (cardinal direction)
FEW	Few
FI(G)	Flight instructor - gliders
ft	Feet (dimensoinal unit - 0,3048 m)
GNSS FR	Global navigation satellite system – flight recorder
GLD	Glider
h	Hour
IAS	Indicated airspeed
km	Kilometre
kt	Knot (airspeed unit - 1,852 km h^{-1})
LKHS	Airfield Hosín
m	Metr
MHz	Megahertz
min	Minute
N	North
NIL	Nothing, no information
NNE	North-north-east
QNH	Altimeter sub-scale setting to obtain elevation when on the ground
RWY	Runway
s	Second
SE	South-east
SEP	Single engine piston
TOW	Aerotowing
TMG	Touring motor glider
UTC	Coordinated Universal Time

A) Introduction

Owner/Operator:	Private
Manufacturer and aircraft model:	AB „Sportine Aviacia“ LAK 12
Registration mark:	OK-1212
Owner/Operator:	Flugsportcentrum Tirol
Manufacturer and aircraft model:	Socata-Groupe Aerospatiale Rallye 180T-D
Registration mark:	D-ESKH
Location of accident:	3 km NNE ARP LKHS
Date and time:	August 14, 2013; 09:58 (all times are UTC)

B) Synopsis

On 14 August 2013 AAII was notified of an occurrence upon collision of LAK 12 glider with a tow rope suspended from the Rallye 180T-D glider tug. Pilots of the aircrafts concerned were taking part in the Hosín airport traffic. The pilot of the LAK 12 was carrying out a thermal flight. Rallye 180T-D was towing ASTIR CS Jeans glider. The pilot of the towed glider recognized that the aerotow was approaching dangerously another glider and released the glider from the tow-rope. The glider tug continued without any manoeuvre to avoid collision. After the release, the rope swung and hit LAK 12 and got caught in its fuselage. Upon the impact, the tow rope perforated the bottom part of the fuselage. The pilot of LAK 12 subsequently landed at LKHS and so did the glider tug and the towed glider. No injuries to persons were reported.

The cause of the accident was investigated by AAII investigator Ing. Stanislav Suchý.

The Final report was released by:

AIR ACCIDENTS INVESTIGATION INSTITUTE
Beranových 130
199 01 PRAHA 99

On 30 September 2013

C) The report includes the following main parts:

1) Factual information
2) Analysis
3) Conclusions
4) Safety recommendation
5) Appendices

1 Factual information

The Event Flight and Personnel Information

The pilot of OK-1212 glider performed a take-off procedure in aerotow from RWY 24 LKHS at 09:49. He then entered into the thermal lift approx. 2,1 km SE from LKHS and according to the GNSS FR record he was climbing and proceeded in circling up to 1,271 m (840 m AGL)[1)].

At 09:55:57 he stopped circling, changed heading[2)] to 006 degrees, left the thermal lift and glided northbound until 09:57:57 when he started right-hand circling. After one 360 degrees turn he again continued in gliding at 005 degrees heading.

In his statement the pilot claimed he was heading to the first formed cumulus. During this manoeuvre he was observing closely the space around his aircraft as he had previously flown in the thermal lift with another glider. During the glide he did not notice any other glider or other type of aircraft.

Suddenly he heard a loud sound of an engine from approx. "7 o'clock" position. Immediately he turned his head in that direction and detected an aircraft towing a glider. The glider tug was approximately on the same flight level on a collision course. The pilot instantly pushed the control stick down vigorously. According to the pilot the risk of collision arose in an extremely short period of time, approx. one and a half seconds. In the last moment he noticed the glider releasing from the glider tug and flying behind him. While pushing the control stick down he was continuously watching the glider tug that was practically in position directly above him, estimated 2 - 3 metres above his cabin. Then he heard several intense bangs to the fuselage and a wing. He crouched in the cabin awaiting the response of the glider and was getting ready for abandoning the cabin. After the series of bangs to the fuselage and a wing he left the glider in a free flight. He was then gradually examining the functioning of both, the pedal and manual controls and also of all the flaps. He could not see the glider tug any longer. He notified the AFIS controller and the instructor and requested a visual check of the glider from the ground or from another aircraft.

The both gliders were equipped with the GNSS FR device recording the flight. Immediately before the collision the data stated in Table No. 1 were recorded. According to the both GNSS FR records, the collision of the OK-1212 glider with the rope behind the glider tug intersecting its trajectory took place between 09:58:47 and 09:58:57. The glider was flying at a height of 1,207 m (703 m AGL) at IAS 93.7 $km.h^{-1}$.

The second glider, ASTIR CS Jeans, OE-5165 that had been released previously at IAS 99.1 $km.h^{-1}$ in the thermal climb 1,3 $m.s^{-1}$, intersected its trajectory about approx. 9 metres higher at 1,216 m (722 m AGL).

The OK-1212 pilot was unable to determine the extent of the collision effects and requested a visual check to establish whether there was a visible damage on the glider. By circling the pilot was trying to keep at such flight level that would allow him to abandon the glider safely in case of an emergency. After about 10 minutes he received information from the AFIS controller that according to a report from a pilot of a different

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1) The output of GNSS altitude is either as true altitude above the selected ellipsoid (the WGS84 ellipsoid for FAI/IGC evidence), or true altitude above an approximate sea level surface known as the Geoid. GNSS data and barometric altitude data were recorded in the form of a regular entry fix.

2) Ground track of the flight trajectory recorded by GNSS FR, measured from the north.

glider circling in the vicinity everything appears to be in normal condition and that he can land safely. Upon the instruction from the instructor he began to descend with slightly opened air brakes. At the circuit level between the 2nd and 3rd turn he felt a noticeable loss of altitude. After a careful approach he landed at LKHS. He was not injured.

The OK-1212 glider pilot was a man, aged 29, a valid glider pilot licence and GLD qualification holder. He held the Medical Certificate Class 2. According to the pilot logbook records of flights in all types of gliders until 14 August 2013 his total hours flown were 179 h 57 min, out of which 7 h 58 min were in LAK 12. In the last 90 days he had a total of 33 h 08 min of hours flown.

Table No. 1: The data of OK-1212 and OE-5165 flight's at 60 s before the collision.

Time	Glider	Pressure altitude [m]	AGL [m]	Vertical speed [$m.s^{-1}$]	IAS [$km.h^{-1}$]	Heading
09:57:57	OK-1212	1166	675	2,7	115,5	005°
	OE-5165	1049	594	1,7	114,3	051°
09:58:07	OK-1212	1195	700	1,7	78,2	139°
	OE-5165	1067	595	2,5	114,7	050°
09:58:17	OK-1212	1200	706	0,8	87,6	289°
	OE-5165	1098	626	3,3	115,6	049°
09:58:27	OK-1212	1210	717	-0,1	91,0	005°
	OE-5165	1136	656	3,3-	114,8	049°
09:58:37	OK-1212	1199	703	-0,3	96,3	003°
	OE-5165	1164	680	2,5	111,1	054°
09:58:47	OK-1212	1204	704	0,4	93,9	357°
	OE-5165	1185	701	2,6	108,1	062°
09:58:57	OK-1212	1207	703	-0,1	93,7	346°
	OE-5165	1216	722	1,3	99,1	069°

The glider tug Rallye 180T-D, D-ESKH pilot claimed in his statement that after the take-off at 09:54 from RWY 24 LKHS he was swinging the 180 degrees turn and was climbing in straight direction at 060 degrees heading with a glider in tow. While observing the surrounding space, he suddenly heard a bang and also the towed glider pilot communicating to him that the tow rope was caught on another glider. The pilot claimed that he was not able to see the said glider. After the landing at LKHS he was taxiing into the clearway where he ascertained the tow rope broke loose from his aircraft.

The glider tug pilot was a man, aged 64, valid private pilot licence holder, issued by Austro Control GmbH on 28 July 2000, with SEP land, TMG and TOW qualifications. He held a valid Medical Certificate Class 2. The pilot claimed to have experience with flying in the DA20, DA40, DV20 and MS 18 aircrafts and in a number of types of gliders. Until 14 August 2013 he had flown, in total in all types of aircraft, 2,141 hours as the pilot-in-command, from which 144 hours in total were in Rallye 180T-D. Within the last 90 days he had flown in total 53 hours. The pilot had experience with aerotowing, having performed 511 in total.

The pilot of the towed glider ASTIR CS Jeans, OE-5165, stated that after the take-off from LKHS in aerotow they swung right 180 degrees turn and were climbing up. He was watching the glider tug in front. At the altitude of approx. 1,150 m he suddenly

spotted another glider approaching fast of which he had had no information. Having assessed the situation, he was apprehensive of a collision and disconnected the glider from the tow rope. Immediately, the glider began to ascend. He saw the other glider fly closely under the glider tug with a clearance of about 3 m and the tow rope winding round the fuselage of the glider before breaking loose. The pilot then reported the incident via the radio communication.

The pilot of the towed glider was a man, aged 41, a holder of a valid glider pilot licence issued by Austrian Aero-Club. He held a valid Medical Certificate Class 2.

The Czech Police subjected the persons involved in the incident to an indicative alcohol breath test with a negative outcome.

Aircrafts

Glider OK-1212

The OK-1212, LAK 12 glider is a single-seat, cantilever high-performance glider with a wingspan of 20.4 m. The main material used in fuselage and wings construction is fibreglass. One-piece cover of the canopy is pressed from organic glass.

Manufacturer:	AB „Sportine Aviacia“
Year of manufacture:	2000
Serial number (s/n):	6235
Total flight time:	851 h 58 min
Total flight time from last inspection:	30 h 03 min

The last annual inspection of the glider was performed on 7 November 2012 with the result airworthy. No defects or faults were ascertained during operation after the said inspection. The glider was painted in white.

Figure 1 Status of the LAK 12 fuselage after the collision.

Glider tug

The glider tug Rallye 180T-D, D-ESKH, is a two-seat single-engine low-wing monoplane with a fixed front undercarriage. It is intended for use in sport flying. It was fitted with a hood for the tow rope without the weak link. The aircraft was painted white in combination with grey colour on the bottom of the fuselage.

Manufacturer:	Morane-Saulnier
Serial number (s/n):	3231
Total flight time:	2567 h 42 min
Total flight time from last inspection:	1 h 27 min

Meteorological situation

A pressure high ridge was affecting the territory of the Czech Republic from the west. According to the expert estimation processed by the Aeronautical Meteorological Service of the Czech Hydrometeorological Institute the situation at ATZ LKHS was arguably as follows:

Surface wind:	290°- 340° / 4 - 6 kt
Altitude wind:	1 500 ft AMSL 330° / 6 kt, 2 000 ft AMSL 340° / 8 kt, 3 000 ft AMSL 340° / 10 kt
Visibility:	above 10 km
Weather:	FEW
Cloudiness:	FEW CU, spodní základna 4 000 – 5 000 ft AGL
Turbulence:	NIL
Temperature:	1 500 ft / + 14°C, 3 000 ft / + 10°C, 140^{o} – 220^{o} / 3 – 6 kt

According to the record of AFIS dispatcher at 12:00 the meteorological conditions at LKHS were: CAVOK, surface wind 300°/5 $m.s^{-1}$, QNH 1,020 hPa.

Site of collision

The collision occurred at approximately 3 km NNE from ARP LKHS, at the altitude approx. 703 m AGL, over scarcely populated area. The glider and tow rope collision site coordinates were N 49° 03‘ 51,9“, E 014° 30‘ 58,02“.

Aerodrome and Communications Information

LKHS is a public domestic airfield. During the published operational hours, RWY 24 was available for operation. The altitude of the airfield is 1,621 ft / 494 m. During the operation, the AFIS unit was activated. Radio-communication was carried out largely in English due to the joint operating of the airfield by aircraft of the Austrian Aero-club. AFIS LKHS 130.200 MHz frequency was used for the radio-communication.

Additional Information

In compliance with Annex 2 to the Convention on International Civil Aviation Regulation The Rules of the Air - L 2 for the Czech Republic stipulates in Section 3.2 "*Responsibility for compliance with the rules of the air"* the following:

Regulation L 2 Chapter 3 General rules, 3.2 Avoidance of collisions:

3.2.1 Proximity

An aircraft shall not be operated in such proximity to other aircraft as to create a collision hazard.

3.2.2 Right-of-way

The aircraft that has the right-of-way shall maintain its heading and speed.

3.2.2.1 An aircraft that is obliged by the following rules to keep out of the way of another shall avoid passing over, under or in front of the other, unless it passes well clear and takes into account the effect of aircraft wake turbulence.

3.2.2.3 Converging

When two aircraft are converging at approximately the same level, the aircraft that has the other

on its right shall give way, except as follows:

a) power-driven heavier-than-air aircraft shall give way to airships, gliders and balloons;

b) airships shall give way to gliders and balloons;

c) gliders shall give way to balloons;

d) power-driven aircraft shall give way to aircraft which are seen to be towing other aircraft or objects.

2 Analysis

Analysis of each of the pilots' performance, mutual approach of the glider and the aerotow has been carried out in order to determine the cause of the collision between the glider and the rope behind the glider tug. From GNSS FR records it has been possible to determine the trajectories of the both gliders with sufficient accuracy[3)] and thus deduce approximate positions of the glider tug until the moment of release of the towed glider.

The pilots are expected to maintain vigilance as required in the general rules of collision avoidance in order to perform manoeuvre necessary to avoid a collision. The glider and the aerotow were operating at ATZ LKHS where there were no circumstances aggravating the conditions for monitoring the air traffic operation.

The OK-1212 glider pilot's statement implies he had not been aware of the aerotow approaching until the moment he heard the sound of the engine and spotted the aircraft with the glider in the tow in a very close proximity, approaching from the left on a collision course.

For the determination of the incident causes, there is a crucial piece of information contained in the glider tug pilot's statement stating he had not seen the glider in contrast to the towed OE-5165 glider pilot who had spotted the glider coming from the right on a converging trajectory at almost identical flight level, recognised the collision hazard and released the glider from the tow.

It has not been possible to determine from the GNSS FR records precisely what visibility conditions there were in the pilot's seat in the glider tug for the visual detection of the glider approaching from the right at approximately same flight level and had the

[3)] OK-1212 (LX 7000) records were being recorded at an interval of 10 s, OE-5165 (LX Colibri) records at an interval of 12 s.

right-of-way pursuant to the rules of collision avoidance. At the time of finishing the 360 degrees right-turn, the glider was approximately by 70 m higher and to the right in relation to the aerotow, with separation of approx. 714 m. Consequently, due to the trajectories convergence and the aerotow's climb, the horizontal as well as vertical separation was reduced. The geometry of the trajectories implies that approx. 20 seconds before the collision the glider was approx. 45 degrees to the left from the trajectory of the glider tug with a minimum clearance and in separation of 600 m. Approx. 10 seconds before the collision it was in separation of 350 m under the angle of 35 degrees to the left and approx. 5 seconds before the collision it was 200 m to the left at 25 degrees.

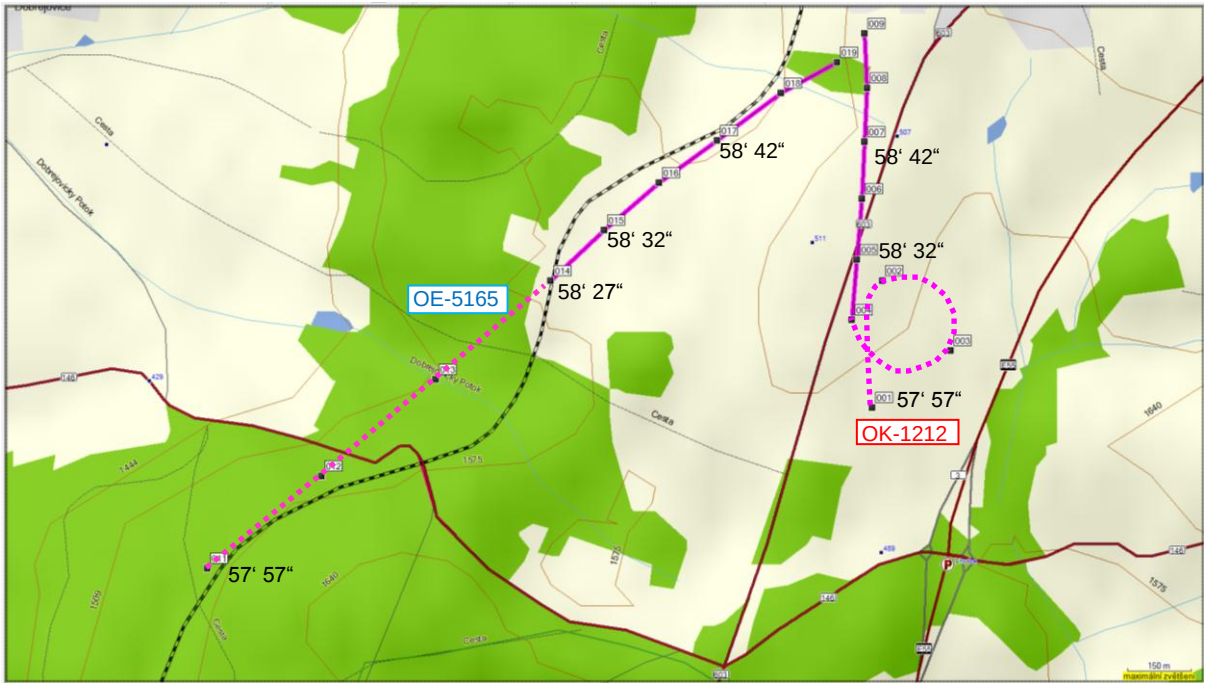

Figure 2 Diagram showing relative locations of OK-1212 prior to the collision with D-ESKH.

The collision occurred at a relative closure speed of approx. 135 km.h^{-1} because the glider tug pilot whose attention was, on a very high level of probability, distracted and not distributed evenly between monitoring the glider in the tow and the operation in the vicinity of his aircraft. During the glide after the right-hand turn swing, the glider pilot spotted the aerotow, probably due to the limited cockpit view angle, only when he noticed the engine noise.

3 Conclusions

The following has been concluded from the investigation:

- the pilots were competent and in full capacity to perform flights,
- the glider tug and both gliders held valid certificates of airworthiness, they were airworthy and had been in normal controllable conditions before the collision,

- the meteorological conditions were no aspect relevant to the emergence and development of the incident,
- the pilot of the glider tug did not ascertain that the aerotow trajectory crosses the one of another glider flying in from the right on an approximately identical flight level,
- the OK-1212 glider pilot most likely did not see the approaching aerotow in time due to the mutual positioning during the glide and the cockpit lookout angle,
- no aircraft section was detached from the OK-1212 glider; the glider was controllable even though the tow rope remained caught in its fuselage.

The probable cause of the mutual collision of the glider with the tow rope was in the distracted attention of the glider tug pilot.

4 Safety recommendation

With regard to accident circumstances the AAII did not make recommendation.

5 Appendices

Appendix 1. Diagram showing trajectory of the glider LAK 12 and OE-5165

Appendix 1

Diagram showing trajectory of the glider LAK 12 and OE-5165 (towed by D-ESKH)