REPUBLIC OF SLOVENIA
MINISTRY OF TRANSPORT
AIRCRAFT ACCIDENT AND INCIDENT INVESTIGATION DIVISION
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Number: 37200-3/2009/36-0010132
Date: 04.10.2010

FINAL REPORT

Glider Accident

ASW 27

Registration mark D-0759

22.05.2009 at 14:26 Local Time

Podkoren, Republic of Slovenia

TABLE OF CONTENTS

INTRODUCTION

This final aircraft accident investigation report contains facts, analysis, reasons established by the aircraft accident investigation commission with regard to the circumstances in which the accident happened.

In accordance with Annex No. 13 to the Chicago Convention and pursuant to the fourth paragraph of Article 137 of the Aviation Act (Uradni list RS [Official Gazette of the Republic of Slovenia] No. 113/06 UPB-1) and the Decree on the investigation of aircraft accidents, serious incidents and incidents (Uradni list RS, No. 72/03 and 110/05) the purpose of the final aircraft accident investigation report is not to establish guilt or individual and collective responsibility. The basic objective of the final report is to prevent aircraft accidents and reduce risks in the future.

It is important to note that the final report on the aircraft accident shall only be used in order to assist with the prevention of further aircraft accidents. The use of this final report on the aircraft accident in question for any other purpose may result in incorrect interpretations.

In case of any divergence of interpretation of the text, the Slovene version shall prevail.

COMPOSITION OF THE ACCIDENT INVESTIGATION COMMISSION

Pursuant to the third paragraph of Article 138 of the Aviation Act (Uradni list RS, No. 113/06–UPB1) and pursuant to Article 7 of the Decree on the investigation of aircraft accidents, serious incidents and incidents (Uradni list RS No. 72/03 and 110/05), the head of the Aircraft Accident and Incident Investigation Division at the Ministry of Transport of the Republic of Slovenia has appointed, by Decision No. 37200-3/2009/1-0010132 of 25 May 2009, a commission for the investigation of ASW 27 glider, registration mark D-0759, with the purpose of investigating the circumstances in which the accident happened, establishing the reasons for the aircraft accident and preparing safety recommendations for the prevention of aircraft accidents in the future.

Composition of the Commission:

1. **Roman ROVANŠEK**, Ministry of Transport, Aircraft Accident and Incident Investigation Division, **Investigator-in-Charge**

2. **Marko PETERNELJ**, Ministry of Transport, Aircraft Accident and Incident Investigation Division, **Member of the Commission**

Pursuant to Chapter 5.18 of Annex No. 13 to the Convention on International Civil Aviation, the German Federal Bureau of Aircraft Accident Investigation (Bundesstelle für Flugunfalluntersuchung – BFU, Braunschweig, Deutschland) appointed the following representative:

- Mr. Frank Stahlkopf, investigator of aircraft accidents at the German Federal Bureau of Aircraft Accident Investigation (Bundesstelle für Flugunfalluntersuchung – BFU, Braunschweig, Deutschland) as an accredited representative of the Federal Republic of Germany as of 26 May 2009.

Pursuant to Chapter 5.18 of Annex No. 13 to the Convention on International Civil Aviation, the investigation authority of the Republic of Austria (BMVIT – II/BAV/UUB/LF (Unfalluntersuchungsstelle des Bundes – Fachbereich Luftfahrt, Wien, Österreich)) appointed the following representative:

- Mr. Martin Veit, investigator of aircraft accidents at the Federal Office of Transport Austria (BMVIT – II/BAV/UUB/LF (Unfalluntersuchungsstelle des Bundes – Fachbereich Luftfahrt, Wien, Österreich)), as an accredited representative of the Republic of Austria as of 5 June 2009.

SYNOPSIS

1. Date and time of accident: 22 May 2009 at 12:26:00 UTC (*)

2. Aircraft: ASW 27 Glider

3. Registration mark: D-0759

4. Location of accident: Podkoren, Republic of Slovenia

5. Type of flight: Gliding competition

6. Operator: Owner of glider

7. Consequences:

7.1 Injuries to persons:

Injuries	*Crew*	*Passengers*	*Others*
Fatal	**-**	**-**	**-**
Serious	**1**	**-**	**-**
Minor/None	**-**	**-**	

7.2 Damage to aircraft: 100% destroyed

7.3 Damage to equipment: 100% destroyed

(*) The time referred to in this report is the Coordinated Universal Time, UTC.
On the date of the accident, two hours must be added for Slovenian local time (UTC+2).

1. FACTUAL INFORMATION

1.1 History of the flight

The pilot took part in an Austrian gliding championship. The flight began at Feldkirchen Airport in Austria at 10:40:02 UTC(*) at an altitude of 529 metres above MSL (mean sea level). With the help of a tow aircraft, the glider rose to an altitude of 1,590 metres above MSL and started gliding at 10:48:30 UTC(*). The pilot navigated the glider over the city of Villach by the slope of the Dobratsch mountain, from where he reached the prescribed competition area over Noetsch Airport at 12:12:53 UTC(*) at an altitude of 1,541 metres above MSL. From the turning point above Noetsch Airport, the flight continued towards Italy and Slovenia, but then the pilot changed direction in the vicinity of the Austrian, Italian and Slovenian borders and remained on the Austrian side (protected from the wind). Between 12:20:31 UTC(*) and 12:22:34 UTC, he attempted to gain altitude for the last time by circling and lost 5 metres of altitude during that period. He then navigated the glider in a broad curve on a low altitude towards the Koren pass, losing approximately 870 metres in altitude after crossing the border between Austria and Slovenia. The aircraft's left wing hit a tree top, flipped over and crashed to the ground.

1.2 Injuries to persons

Injuries	*Crew*	*Passengers*	*Others*
Fatal	**-**	**-**	**-**
Serious	**1**	**-**	**-**
Minor/None	**-**	**-**	

1.3 Damage to aircraft

The aircraft and its equipment were 100% destroyed in the crash.

1.4 Other damage

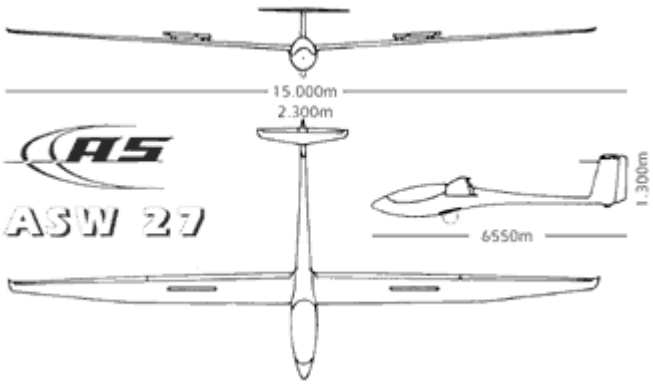
The aircraft's left wing hit a tree top and then crashed on a grass slope. One tree was damaged in the crash. There was no other damage.

1.5 Personnel information

Pilot:	Male, 62 years of age
Nationality:	Austrian
Flying licence:	GPL - Glider Pilot Licence
	Valid until: 4 January 2013
Medical Certificate:	Medical Certificate Class 2
	Valid until: 4 January 2010

1.6 Aircraft information

- Aircraft: Glider
- Type: ASW 27
- Registration mark: D-0759
- Serial number: 27044
- Year of manufacture: 1997
- Manufacturer: Alexander Schleicher GmbH & Co., Segelflugzeugbau Poppenhausen, Bundesrepublik-Deutschland
- Country of registration: Germany
- Owner: Pilot involved in the accident
- Entry of aircraft in the register: 29 March 1997
- Certificate of airworthiness: Issued on 29 March 1997, valid until March 2010
- Last maintenance check: 9 March 2009



Glider ASW 27

1.7 Meteorological information

Meteorological information on the weather conditions on the day of the accident was provided to the commission by the Aviation Meteorology Service of the Environmental Agency of the Republic of Slovenia. The following meteorological conditions were prevalent in the area of Podkoren on 22 May 2009 from 11.00 hrs to 15.00 hrs local time:

- meteorological visibility above 10 kilometres
- air temperature approximately 25°C
- partially clear sky with up to 3/8 cumulus cloudiness and up to 4/8 middle cloudiness
- no precipitation
- south-western winds blew in the Rateče area with an average speed of up to 6 knots and gusts of up to 15 knots
- south-western winds blew at high altitude speeds of up to 15 knots and gusts of up to 35 knots

1.8 Aids to navigations

The aircraft was equipped with basic instruments, such as an airspeed indicator, an altitude indicator and a compass.

1.9 Communications

Communication took place on a frequency of 122,700 MHz, published by the organiser of the competition.

1.10 Aerodrome information

Since the accident happened during the flight, airport information is irrelevant.

1.11 Flight recorders

The rules for this category of aircraft do not require flight recorders (FDR/CVR).

1.12 Information from the scene of the accident

It was established at the scene of the accident that the aircraft had flown from the direction of the former border crossing Korensko sedlo. The visible traces on the tree and grass slope revealed that the aircraft's left wing hit a tree top, flipped over and crashed on the grass slope. Before the arrival of the Chief Investigator at the scene of the accident, the injured pilot trapped in the cockpit was

rescued by the rescue service. The injured pilot was examined by a doctor and transferred to the University Medical Centre Ljubljana in a helicopter.

1.13 Medical and pathological information

The glider pilot suffered severe injuries to the head, thorax, lungs and heart, a fracture of facial bone, skull, left ankle, right wrist, an injury of the left eye and an injury of a nerve in the right leg. He was transferred from the University Medical Centre Ljubljana to Austria for further treatment on 27 May 2009.

1.14 Fire

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1.15 Survival aspects

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1.16 Course of investigation

- The Chief Investigator inspected the scene of the accident on 22 May 2009. Police and firemen were present at the scene of the accident before the arrival of the Chief Investigator. The site of the accident was protected by the police. After the completed examination, the wrecked glider was transferred to protected premises.
- On 25 May 2009, the Aircraft Accident and Incident Investigation Division at the Ministry of Transport of the Republic of Slovenia has, on the basis of Chapter 5.18 of Annex No. 13 to the Convention on International Civil Aviation, notified the German Federal Bureau of Aircraft Accident Investigation (Bundesstelle für Flugunfalluntersuchung – BFU, Braunschweig, Deutschland) as the country of registration of the aircraft, and the investigation authority of Austria (BMVIT – II/BAV/UUB/LF (Unfalluntersuchungsstelle – Luftfahrt, Wien, Austria) as the country of operator. Both authorities provided the names of authorised representatives, who assisted in the investigation without travelling to and inspecting the site of the accident.
- On 27 May 2009, the commission for the investigation of the aircraft accident obtained meteorological information on the weather conditions on 22 May 2009 from the Aviation Meteorology Service of the Environmental Agency of the Republic of Slovenia.
- On 18 June 2010, the Draft Final Report was issued.

1.17 Data on the operator

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1.18 Other information

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1.19 Investigation techniques

Classical investigation techniques were used. Flight information was acquired from the aircraft instruments.

2. ANALYSIS

2.1 Source of information

Flight information was acquired from the instruments of the aircraft involved in the accident on 22 May 2009. The information was obtained from the following two devices:

1. Palm computer Compaq iPaq 3870, P/N 230398-041, S/N 4G24DW34O2W3
2. Variometer and flight computer LX 7007 pro IGC, S/N 21616

The data from these two devices remained saved in the memory of the Compaq iPaq palm computer. Its programme package, WinPilot, saved data inputted from the LX 7007 pro IGC device in the form of standardised NMEA 0183 phrases and additional phrases standardised by LX Navigation d.o.o., manufacturer of the LX 7007 pro IGC device. The FLARM device was too damaged to allow the reading of useful information. Data inputted were converted to the standardised form of an IGC file. The following information could be read for almost every second of the flight:

- Time (in UTC form)
- Latitude in degrees, minutes and decimal seconds under the WGS 84 system
- Longitude in degrees, minutes and decimal seconds under the WGS 84 system
- Pressure altitude in metres
- GPS altitude in metres
- True Airspeed (TAS) in km/h
- Groundspeed (GS) in km/h
- True Track (TRK) in degrees from true north
- compensated variometer in m/s

The wind information, as calculated by LX 7007 pro IGC, during the flight was also recorded, but in less frequent and imprecisely distributed time intervals, which, however, does not considerably impact the analysis. The acquired information in the form of an IGC file was analysed with the programme SeeYou, version 3.94, the author of which is Naviter d.o.o. The SeeYou software

enabled the calculation of several other data and a plastic view of the flight, with the help of maps and satellite records.

The software calculated the information based on:

- local time, which was UTC+2 on the day of the flight;
- altitude above the digital model of relief (AGL), used in the SeeYou programme. The model observes one piece of altitude information for every 90 metres of latitude and longitude. The information originates from NASA;
- the altitude above sea level (MSL), calculated with the help of data on take-off altitude and the altitude of terrain relief; the difference between the recorded pressure altitude and the terrain altitude in this point is used as a reference for all points of flight;
- the indicated air speed of flight (IAS), calculated with the help of TAS information and pressure altitude; and
- the wind information, calculated from many different flight points with the application of statistical data to the data on flight direction (TRT), ground speed (GS) and true airspeed (TAS).

2.2 Possible sources of measurement errors

- The digital model of relief has certain errors. While the source does not state or guarantee the precise measurement of the terrain altitude for a given point, the altitudes between individual pieces of information are interpolated by means of linear interpolation methods.
- South-western winds blew during the flight; in this region, such a wind is typically connected with the lowering of air pressure. If the pressure did indeed change during the flight, this means that the recorded pressure altitudes are higher than actual altitudes. A small discrepancy between the terrain altitude and the measured pressure altitudes at the end of the flight leads to the conclusion that the error is small.
- Gauges for altitude, speed and flight directions have a certain response time. Due to the endurance of the aircraft, the recorded values are reasonably accurate until a few seconds before the accident, while the last two records suggest the possibility that the measured values are less accurate than before.
- When calculating the direction and power of the wind, a multitude of information is needed, as the wind is calculated with the help of statistical analysis of measurements. Therefore, the time lapse in the calculation of the direction and power of the wind is considerable, and the

wind demonstrated by the SeeYou programme does not represent a suitable basis for deducing the power and direction of the wind in the area of the accident.

2.3 General information about the flight

The flight began at Feldkirchen Airport in the Republic of Austria at 10:40:02 UTC(*) at an altitude of 529 metres above MSL. With the help of a tow aircraft, the glider rose to an altitude of 1590 metres above MSL and started gliding at 10:48:30 UTC(*). The pilot navigated the aircraft over the city of Villach by the slope of the Dobratsch mountain, from where he reached the prescribed competition area over Noetsch Airport at 12:12:53 UTC(*), at an altitude of 1541 metres above MSL. The wind in this part of the flight may be measured with the help of information on groundspeed and true airspeed. The measured wind moved between the directions 235–260° with a speed of between 11–25 km/h, which indicates a moderate wind from the south-west. From the turning point above Noetsch Airport, the flight continued towards Italy and Slovenia, but then the pilot changed direction in the vicinity of the Austrian, Italian and Slovenian borders and remained on the Austrian side (protected from the wind). Between 12:20:31 UTC(*) and 12:22:34 UTC(*), he attempted to gain altitude by circling and lost 5 metres of altitude during that period. After that, he directed the aircraft in a broad curve on a low altitude towards the Koren pass, losing approximately 870 metres in altitude after crossing the border between Austria and Slovenia. As a result, the flight ended with an accident. The last recording of the flight of aircraft D-0759 was made at 12:25.10 UTC(*) and contains the following data:

1. Position: N 46°30.600' E 013°45.006'
2. Altitude in MSL: 1,063 m
3. Groundspeed: 90 km/h

2.4 Analysis of information for the last 140 seconds of flight

Until 12:23:50 UTC(*), the aircraft flew at altitudes higher than 100 metres above terrain. From this time onwards, the aircraft flew at lower altitudes. At that moment, it was 2,100 metres from the site of accident and located 87 metres above the point where the record ends. The selected flight information leads to the conclusion that wind conditions in this final part of the flight were prominently diverse, for it started with the back wind, the first major lowering of air occurring at 12:24:07 UTC(*), while at 12:25:05 UTC(*), a few seconds before the end of the record, a strong gust of frontal wind may be observed, which is related to repeated major lowering. The pilot navigated the aircraft with speeds ensuring the best glide angle of flight in the given circumstances.

Nevertheless, he flew lower than 30 metres above the terrain model for the last 30 seconds, and even less than 10 metres above the terrain model for the last 20 seconds.

3. CONCLUSIONS

3.1 Findings

1. The pilot held a valid Glider Pilot Licence (GPL)
2. The pilot held a valid Medical Certificate Class 2
3. The glider had a valid certificate of airworthiness
4. The last service inspection of the glider was carried out on 9 March 2009 by a relevant maintenance organisation
5. The following meteorological conditions were prevalent in the area of Podkoren on 22 May 2009 from 11.00 hrs to 15.00 hrs local time:
    - meteorological visibility above 10 km
    - air temperature approximately 25°C
    - partially clear sky with up to 3/8 cumulus cloudiness and up to 4/8 middle cloudiness
    - no precipitation
    - south-western winds blew in the Rateče area with an average speed of up to 6 knots and gusts of up to 15 knots
    - south-western winds blew at the altitude of the aircraft with a speed of up to 6 knots and gusts of up to 35 knots
    - the pilot navigated the aircraft with speeds ensuring the best glide angle of flight in the given circumstances
    - for the last 30 seconds, it flew lower than 30 metres above the terrain model, and for the last 20 seconds, even less than 10 metres above the terrain model.

3.2 Cause of Accident

HUMAN FACTOR:

Loss of altitude due to an incorrect decision made by the pilot – flying over Korensko sedlo.

4. SAFETY RECOMMENDATIONS

No safety recommendations.

APPENDIX A: Reconstruction the flight route

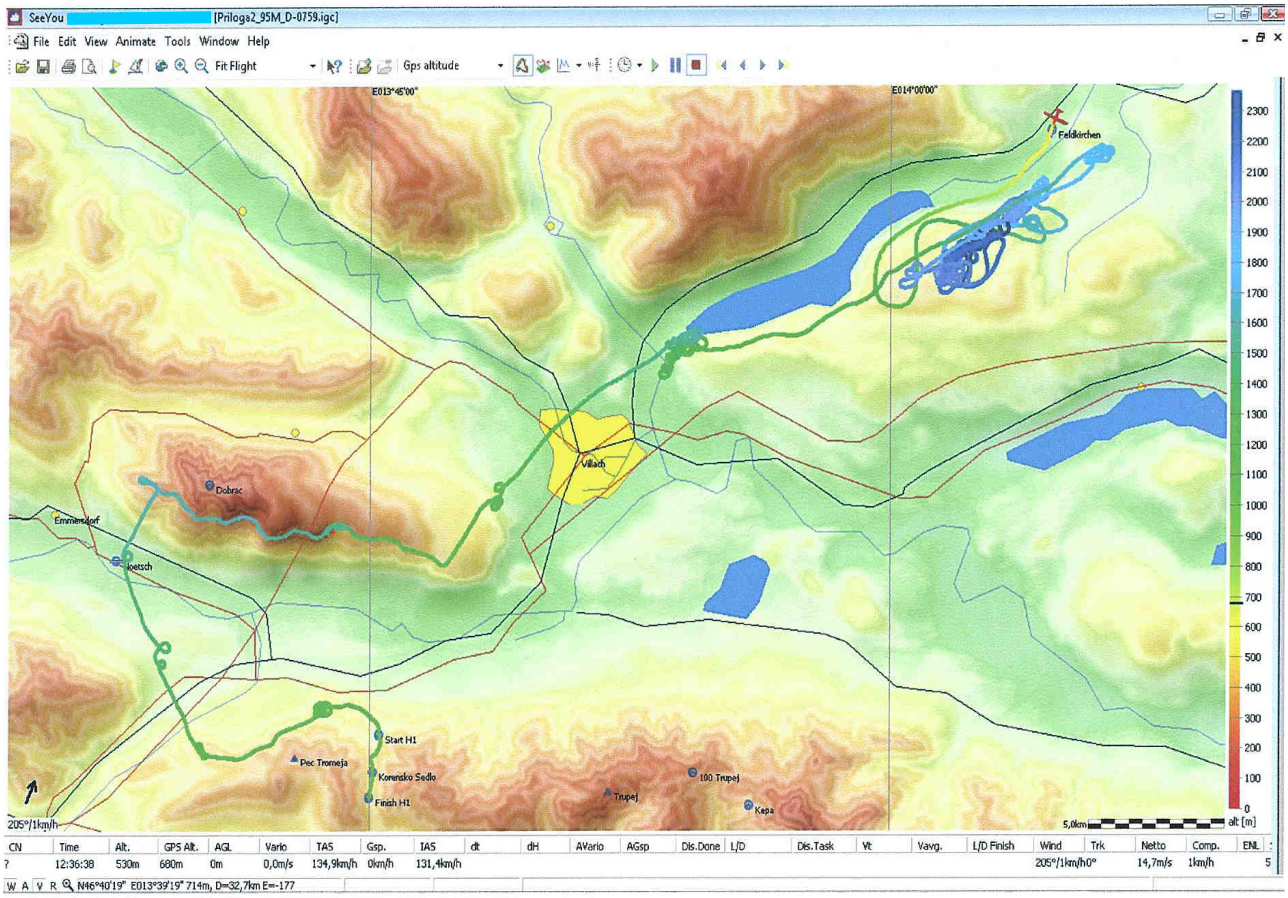

Image 1: Record of total flight route showed on vectorial map of field

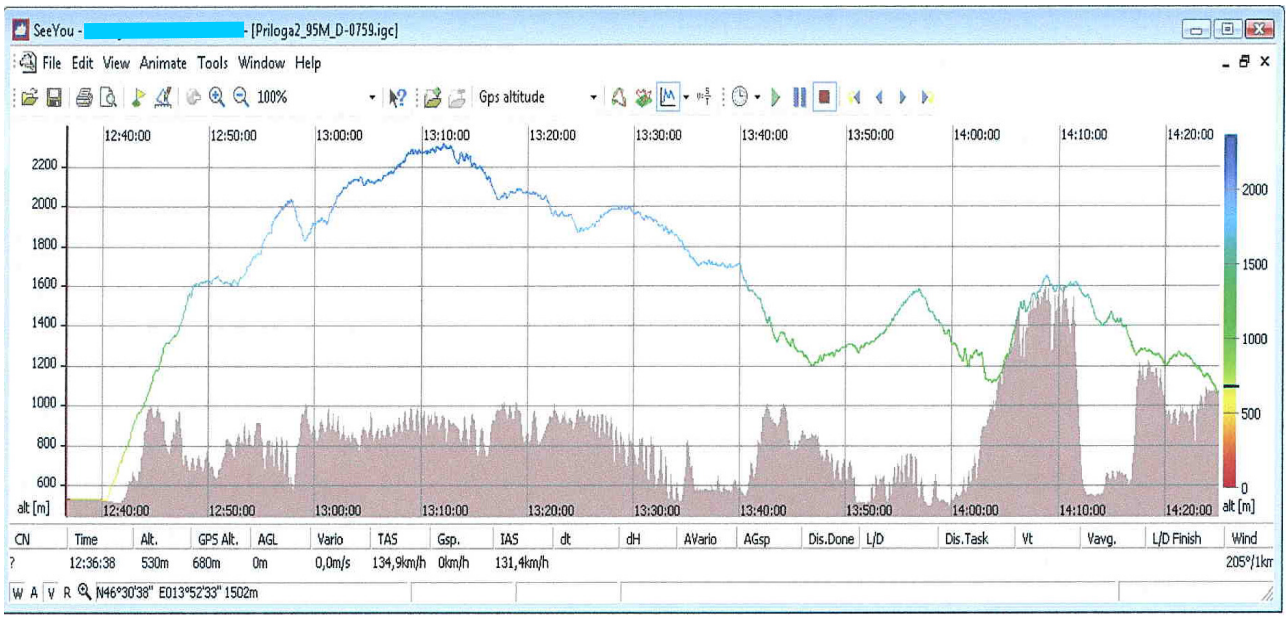

Image 2: Barogram of total flight, brown surface is presenting ground vertically under a plane

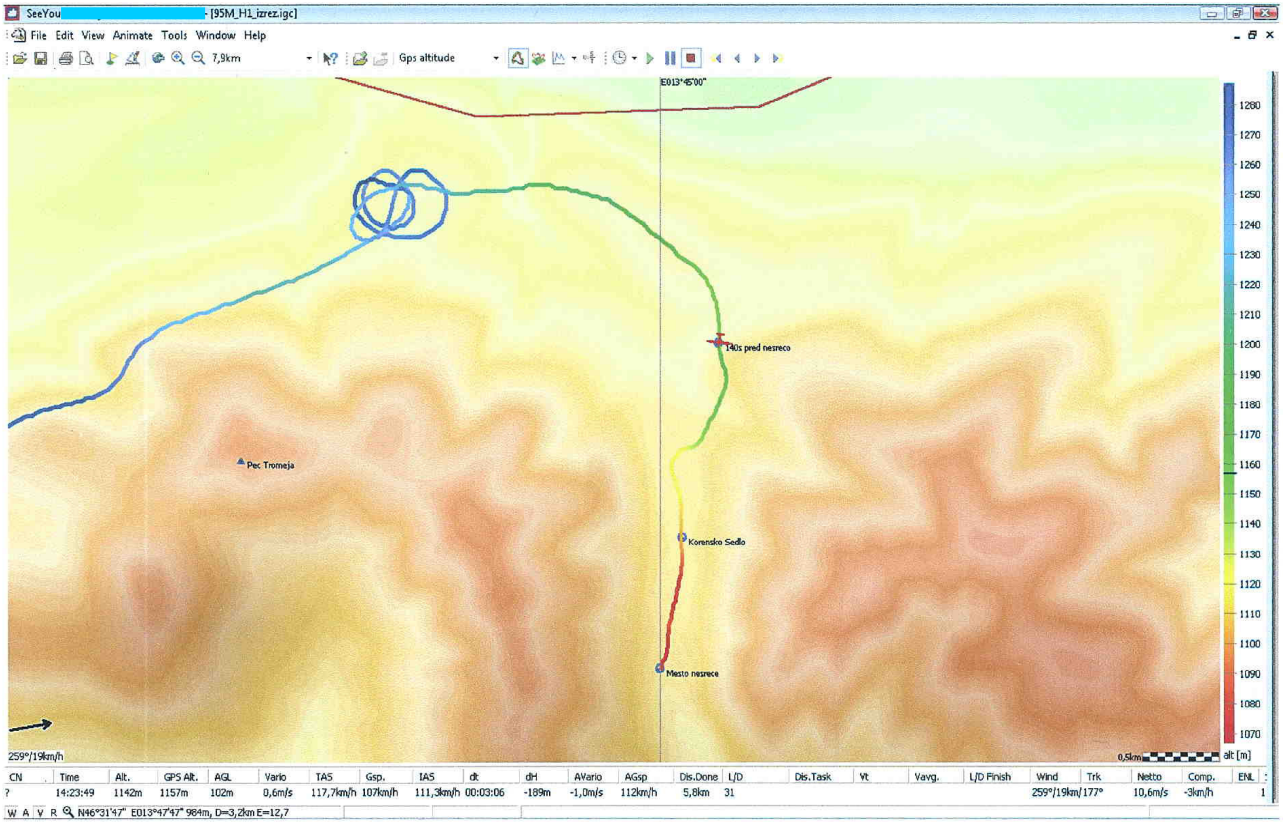

Image 3: Reconstruction last part of flight

APPENDIX B: Data for the last 140 seconds of flight

Čas UTC	Viš. MSL	Viš. AGL	Vario	TAS	GS	Komp. vetra
Enota	*[m]*	*[m]*	*[m/s]*	*[km/h]*	*[km/h]*	*[km/h]*
12:23:50	1149	100	1.64	118.5	104.0	14.5
12:23:51	1150	89	2.46	118.6	100.0	18.6
12:23:52	1151	84	2.15	118.2	97.0	21.2
12:23:53	1152	75	1.78	116.6	94.0	22.6
12:23:54	1154	70	0.95	113.8	91.0	22.8
12:23:55	1155	67	0.26	111.2	90.0	21.2
12:23:56	1156	63	-0.13	110.4	91.0	19.4
12:23:57	1157	60	-0.07	111.6	92.0	19.6
12:23:58	1158	59	-1.29	111.4	94.0	17.4
12:23:59	1159	68	-1.39	113.9	98.0	15.9
12:24:00	1158	72	-0.68	118.1	102.0	16.1
12:24:01	1158	77	-0.01	121.2	104.0	17.2
12:24:02	1157	88	-0.04	122.8	103.0	19.8
12:24:03	1156	95	-0.09	122.4	102.0	20.4
12:24:04	1155	107	-1.08	119.8	101.0	18.8
12:24:05	1154	114	-1.56	117.4	100.0	17.4
12:24:06	1152	96	-2.29	115.4	100.0	15.4
12:24:07	1151	88	-2.59	114.2	100.0	14.2
12:24:08	1150	79	-2.14	113.9	98.0	15.9
12:24:09	1149	70	-1.58	114	97.0	17
12:24:10	1149	70	-1.06	113.6	96.0	17.6
12:24:11	1148	70	-2.33	111	95.0	16
12:24:12	1147	69	-3.21	109.7	96.0	13.7
12:24:13	1146	68	-2.1	111.7	98.0	13.7
12:24:14	1144	68	-2.19	112.2	101.0	11.2
12:24:15	1142	67	-4.23	110.1	102.0	8.1
12:24:16	1140	67	-4.93	108.9	103.0	5.9
12:24:17	1138	67	-4.41	109.2	105.0	4.2
12:24:18	1135	65	-3.54	110.2	108.0	2.2
12:24:19	1132	62	-4.13	108.1	108.0	0.1
12:24:20	1129	59	-2.88	109.6	108.0	1.6
12:24:21	1126	57	0.31	115.2	107.0	8.2
12:24:22	1123	54	1.56	119.4	105.0	14.4
12:24:23	1120	51	1.28	123.2	105.0	18.2
12:24:24	1118	49	1.09	125.2	103.0	22.2
12:24:25	1116	47	1.24	126.1	101.0	25.1
12:24:26	1115	46	1.2	125.4	97.0	28.4
12:24:27	1114	44	-1.17	119.5	95.0	24.5
12:24:28	1114	44	-1.96	115.9	93.0	22.9
12:24:29	1113	43	-1.2	115.1	93.0	22.1
12:24:30	1113	43	-2.54	111.9	93.0	18.9

12:24:31	1112	42	-3.86	109.1	94.0	15.1
12:24:32	1112	42	-3.11	110.4	95.0	15.4
12:24:33	1112	42	-2.21	111.5	95.0	16.5
12:24:34	1111	41	-2.39	110.6	94.0	16.6
12:24:35	1110	40	-2.5	109.5	93.0	16.5
12:24:36	1109	39	-1.9	107.9	92.0	15.9
12:24:37	1107	36	-1.69	107.2	92.0	15.2
12:24:38	1105	33	-2.19	106.1	93.0	13.1
12:24:39	1103	30	-2.35	106.2	95.0	11.2
12:24:40	1102	28	-1.63	107.8	96.0	11.8
12:24:41	1100	25	-1.45	107.9	96.0	11.9
12:24:42	1099	23	-2.18	105.4	96.0	9.4
12:24:43	1097	20	-2.52	102.8	96.0	6.8
12:24:44	1096	20	-3.42	100.2	98.0	2.2
12:24:45	1094	20	-3.12	99.6	102.0	-2.4
12:24:46	1092	21	-2.1	102.2	105.0	-2.8
12:24:47	1090	20	-1.04	107	108.0	-1
12:24:48	1087	17	-1.49	109.2	110.0	-0.8
12:24:49	1085	15	-2.67	109	111.0	-2
12:24:50	1082	12	-3.3	108.8	113.0	-4.2
12:24:51	1080	10	-2.94	108.8	113.0	-4.2
12:24:52	1077	7	-1.98	109.1	112.0	-2.9
12:24:53	1075	5	-1.04	109.3	110.0	-0.7
12:24:54	1073	3	-1.17	107.5	108.0	-0.5
12:24:55	1072	2	-0.72	106.6	105.0	1.6
12:24:56	1071	1	-0.66	104.5	103.0	1.5
12:24:57	1071	1	-0.56	102.9	100.0	2.9
12:24:58	1072	2	-0.38	100.7	97.0	3.7
12:24:59	1072	2	-0.71	97.1	95.0	2.1
12:25:00	1073	3	-1.43	93.9	94.0	-0.1
12:25:01	1073	3	-1.9	92.4	95.0	-2.6
12:25:02	1072	2	-1.53	94.9	99.0	-4.1
12:25:03	1071	2	-1.18	97.8	102.0	-4.2
12:25:04	1070	2	-3.47	94.4	105.0	-10.6
12:25:05	1070	5	-6.75	85.7	104.0	-18.3
12:25:06	1068	4	-2.18	88.8	101.0	-12.2
12:25:07	1067	7	2.23	95.2	97.0	-1.8
12:25:08	1066	7	0.23	92.1	92.0	0.1
12:25:09	1065	6	-1.43	81.3	90.0	-8.7
12:25:10	1063	7	-5.01	46	90.0	-44

APPENDIX C: Data of windy circumstances before a accident

Čas UTC	Viš. MSL	Viš. AGL	Vario	TAS	GS	Komp. vetra
Enota	*[m]*	*[m]*	*[m/s]*	*[km/h]*	*[km/h]*	*[km/h]*
12:23:51	1150	89	2.46	118.6	100.0	18.6
12:24:07	1151	88	-2.59	114.2	100.0	14.2
12:24:16	1140	67	-4.93	108.9	103.0	5.9
12:24:22	1123	54	1.56	119.4	105.0	14.4
12:24:45	1094	20	-3.12	99.6	102.0	-2.4
12:25:05	1070	5	-6.75	85.7	104.0	-18.3
12:25:10	1063	7	-5.01	46	90.0	-44

APPENDIX D: Photographs of the location of accident