



MINISTRY OF TRANSPORT, POSTS AND TELECOMMUNICATIONS OF THE SLOVAK REPUBLIC

Air Accident and Incident Investigation Board
Nám. slobody 6, P.O. BOX 100, 810 05 Bratislava 15

Reg. No: SKA2010002

FINAL REPORT

on air accident investigation
of paragliders **VEGA 2XS** and **VEGA 2M**
Identification No: **OM-P124** and **OM-P069**

Date: 25.04.2010

Place: Martinské Hole

A. INTRODUCTION

The investigation of an air accident [AA], serious incident [SI], has been conducted pursuant to Art. 18 of the Act No 143/1998 on Civil Aviation (Civil Aviation Act) and on Amendment of Certain Acts.

The final report is issued in accordance with the Regulation L 13 that is the application of the provisions of ANNEX 13 Air accident and Incident Investigation to the Convention on International Civil Aviation and with the Council Directive 94/56/EC, establishing the fundamental principles governing the investigation of civil aviation accidents and incidents.

The exclusive aim of investigation is to establish causes of an accident or serious incident and prevent their occurrence, but not to refer to any fault or liability of persons.

This final report, its individual parts or other documents related to the investigation of the air accident have informative character and can only be used as recommendation for the implementation of measures to prevent occurrence of other air accidents and serious incidents with similar causes.

Operator / Owner:	private persons
Type of operation:	general aviation
Type of aircraft:	paraglider VEGA 2 version XS
Type of aircraft:	paraglider VEGA 2 version M
Identification No:	VEGA 2XS – OM-P124, VEGA 2M – OM-P069
Place of take-off:	Martinské Hole
Place of landing:	Martinské Hole
Flight phase:	free flight
Place of accident:	Martinské Hole, ski downhill course
	Geographic coordinates of the place of air accident: 49°05'47,58" N, 018°49'27,18" E

Date and time of detection of accident: 25.04.2010, 10 h 30 min

Note: All time data in this report are stated in the UTC time.

B. INFORMATIVE SUMMARY

Following the start and the free flight two paragliders crashed into each other. After the collision both pilots fell to the ground, hanging on one rescue parachute.

The pilots were injured.

The following person was appointed as investigator of the air accident:

Ing. GREGA Milan, member of the Permanent investigation commission

The report is issued by:

Air Accident and Incident Investigation Board
of the Ministry of Transport, Posts and Telecommunications of the Slovak Republic

C. MAIN PART OF REPORT

1. FACTUAL INFORMATION
2. ANALYSES
3. CONCLUSIONS
4. SAFETY RECOMMENDATIONS

1. FACTUAL INFORMATION

1.1 History of the flight

The pilot of paraglider OM-P124 started from the take-off surface of Martinské Hole and conducted a free flight in direction of the city of Martin to the upper border of a forest enclosing a ski downhill course. He was maintaining the flying height at the height level of the starting point (approximately the top of the Martinské Hole mountains). The second pilot started with a short delay, but in a safe distance, after the first pilot with paraglider OM-P069. He flew in the same direction as the first pilot, but kept to the right (in the flight direction) and maintained a low vertical separation. In this flight phase the second pilot had a permanent visual contact with the first pilot. The first pilot registered a climbing air current and decided to turn to the right. He visually evaluated the second pilot's position as a safe distance in a lower height after he had started the right-hand turn. The second pilot continued more or less straight flight from the hill against wind. He evaluated the first pilot's position as a flight in a safe distance. This situation was recorded about 5-10 min after the start of the first pilot. The first pilot made a right-hand turn of 360° and continued with another turn of 360°. During this turn he had a permanent visual contact with the second pilot and evaluated the distance between both pilots as small, but safe. The second pilot was flying more or less in the same straight direction and evaluated the first pilot's position as a counter-flight with a low vertical separation. He also assumed a safe escaping manoeuvre and therefore did not change the flight direction by control interference to avoid potential negative consequences of sudden control interference for the flight of the paraglider. In the phase of a counter-flight (with the first pilot flying against the hill – with wind and the second pilot flying from the hill – against wind) in a height of 150-250 m above ground level the upper part of the first pilot's body got caught on the parachute of the second pilot's paraglider. At that moment the second pilot immediately initiated the emergency parachute which inflated without problems. The first pilot was wrapped in the parachute of the second pilot's paraglider so tightly that he was unable to initiate his own emergency parachute or to break free. Both pilots fell on the inclined grass surface of the downhill course approximately 5 m from the upper border of the forest, hanging on one emergency parachute (emergency parachute of the second pilot). The first pilot (wrapped in the parachute of the paraglider) fell on the ground first, with his heels and then with his back. The second pilot fell on the ground second, with the lower part of his back.

Daytime: Day

The air accident was reported to the Air Accident and Incident Investigation Board of the Ministry of Transport, Posts and Telecommunications of the Slovak Republic on 25 April 2010.

1.2 Injuries to persons

Injury	Crew	Passengers	Other persons
Fatal	-	-	-
Serious	2	-	-
Minor	-	-	-
None	-	-	-

1.3 Damage to aircraft

The paragliders were not damaged in the air accident.

1.4 Other damages

The Air Accident and Incident Investigation Board was not informed about circumstances with potential claims for compensation of other damages toward a third party.

1.5 Personnel information

Pilot of paraglider OM-P124:

Citizen of Slovak Republic, 40 years old.

Holder of the PK-A pilot licence No: 4-1537, issued by the Light Aircraft Association of SR on 2 October 2008.

Qualifications:

PK-A pilot since 2 October 2008 with marked validity until 23 September 2010.

Medical certificate kept in aviation specialist records of LAA SR, of 23 September 2008, with validity until 23 September 2010.

Flying experience:

Total flying hours: 50 h 00 min

Of which for the previous 90 days: 05 h 10 min

Of which for the previous 90 days with this paraglider type: 05 h 10 min

Flying hours on the day of accident (including the critical flight): 00 h 10 min

Pilot of paraglider OM-P069:

Citizen of Slovak Republic, 40 years old.ä

Holder of the PK-A pilot licence No: 4-763, issued by the Light Aircraft Association of SR on 17 June 2003.

Qualifications:

PK-A pilot with marked validity until 19 September 2010.

Medical certificate kept in aviation specialist records of LAA SR, of 19 September 2008, with validity until 19 September 2010.

Flying experience:

Total flying hours: 50 h 00 min

Of which for the previous 90 days: 01 h 10 min

Of which for the previous 90 days with this paraglider type: 01 h 10 min

Flying hours on the day of accident (including the critical flight): 00 h 10 min

1.6 Aircraft information

Paraglider OM-P124

Type: one-seat paraglider VEGA 2XS

Serial No: 23965409 XS

Year of manufacture: 2009

Manufacturer: AXIS PARAGLIDING, Czech Republic

Total flying hours from the year of manufacture: 10 h 00 min

Certificate of airworthiness No. OM-P124 issued by LAA SR on 13 October 2009 with marked validity until 31 October 2011, revision on 31 October 2010

Calculation of aircraft weight at the time of air accident:

Empty weight of aircraft	4.9 kg
Weight of crew	58.0 kg
Weight of outfit of the crew	14.0 kg

Total aircraft weight at the time of AA: **76.9 kg**

The maximum permissible take-off weight of aircraft according to the flight manual is **80 kg**.

The aircraft weight at the time of accident was within the permitted range.

Paraglider OM-P069

Type: one-seat paraglider VEGA 2M

Serial No: 23963106MC

Year of manufacture: 2009

Manufacturer: AXIS PARAGLIDING, Czech Republic

Total flying hours from the year of manufacture: 01 h 10 min

Certificate of airworthiness No. OM-P069, issued by LAA SR on 21 December 2009, with marked validity until 31 December 2011, revision on 31 December 2010.

Calculation of aircraft weight at the time of air accident:

Empty weight of aircraft	5.9 kg
Weight of crew	85.0 kg
Weight of outfit of the crew	17.5 kg

Total aircraft weight at the time of AA: **108.4 kg**

The maximum permissible take-off weight of aircraft according to the flight manual is **110 kg**.

The aircraft weight at the time of accident was within the permitted range.

1.7 Meteorological situation

Meteorological situation CAVOK. Wind direction: north-east, wind speed: 1–4 m/s. Meteorological conditions for given flight area were very suitable.

1.8 Aids to navigation

Not applicable.

1.9 Communications

Not applicable.

1.10 Aerodrome information

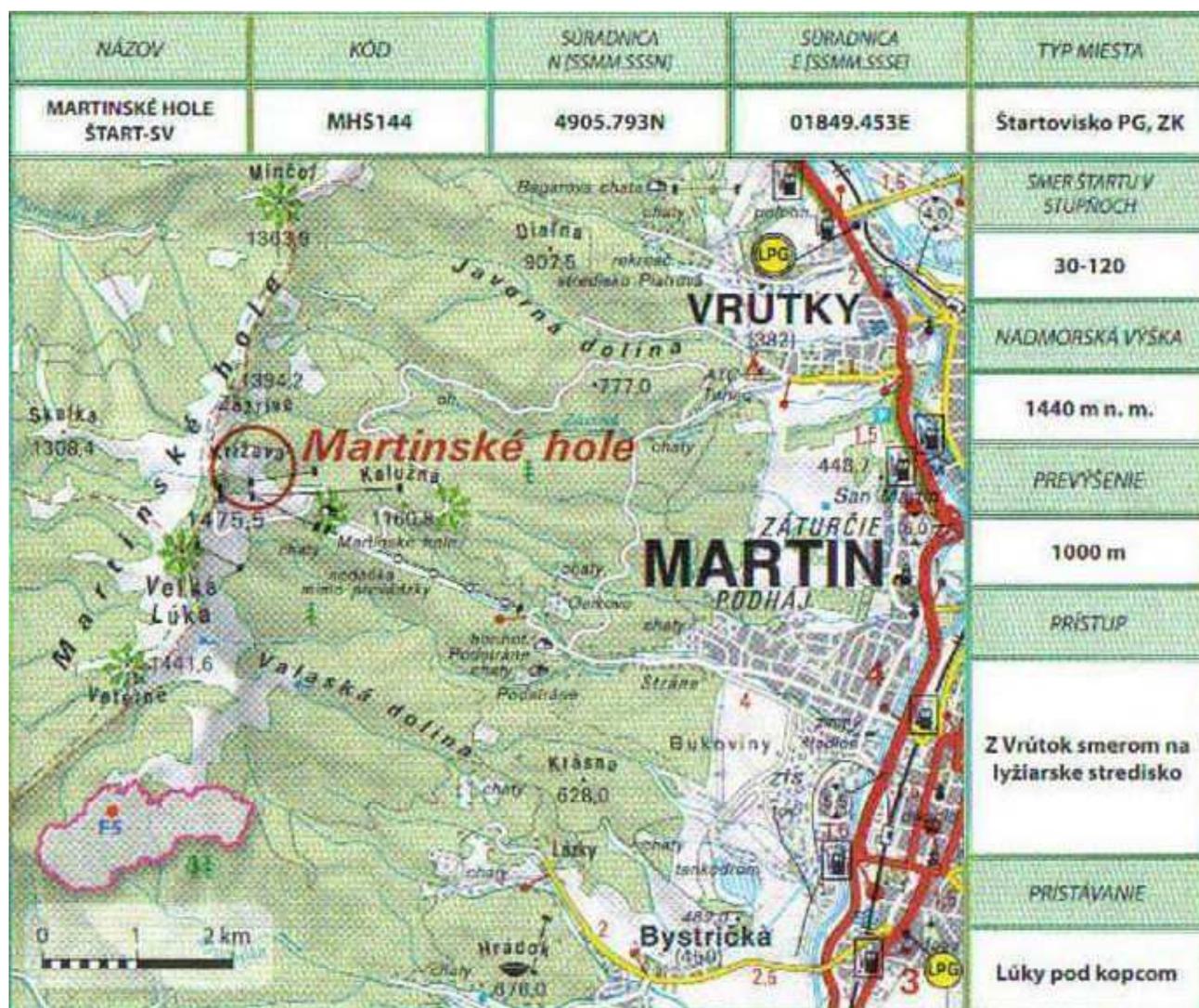
Martinské Hole - take-off surface for parachute and hang gliders situated in the central part of the Mala Fatra mountains. The respective owner approved the use of the surface for the Light Aircraft Association of SR. The surface is a grass clear area deprived of trees, slanting toward the south-east. The condition of the surface allows its use for determined purpose. The altitude of Veľka Luka is 1475.5 m above sea level. The take-off area itself is situated in the north-east and vertically closer to the top. It consists of a slanting longer meadow ended by a forest that does not continue with a sloping profile, but runs in a more horizontal direction. This forest is a natural barrier, especially for gliders with a lower gliding range, which they have to overflow to be able to continue the flight.

1.11 Flight recorders and other recording systems

Not applicable.

1.12 Wreckage and impact information

The point of impact of paragliders with pilots is situated in the lower part of the ski downhill course, approximately 5 m from the forest border. The impact point is a grass area without obstacles. The paraglider pilots fell to the ground approximately in the direction of a contour line.



1.13 Medical and pathological findings

The first pilot falling to the ground suffered a serious injury without negative impact on occurrence of consequences of the accident. The second pilot suffered a serious backbone injury.

1.14 Fire

Not applicable.

1.15 Survival aspects

The search and rescue using SAR devices was not necessary. The emergency medical service was called to the injured pilots. The use of an emergency parachute by one of the paraglider pilots contributed to the mitigation of injuries caused by the fall from height.

1.16 Tests and research

Tests and research beyond the scope of standard basic research methods were not required.

1.17 Organizational and management information

Not applicable.

1.18 Additional information

A) According to the statements of the first and the second pilots neither of them has flying experience from competitions, where flights in a group of pilots are common. Neither of them participated in any competition of this type or flights in a group of pilots.

B) Parameters of paraglider VEGA 2M – minimum flight speed 23 km/h, maximum flight speed 56 km/h, minimum take-off weight 85 kg, maximum take-off weight 110 kg, empty weight 5.9 kg.

Parameters of paraglider VEGA 2XS - minimum flight speed 23 km/h, maximum flight speed 56 km/h, minimum take-off weight 60 kg, maximum take-off weight 80 kg, empty weight 4.9 kg.

Emergency parachute of the second pilot Axis Para Happy 35, serial No 0063253, for the maximum load (120 kg) the rate of descent is 5 m/s.

C) From the statement of the pilots it follows that from the start of paraglider operation that he received as new, they noticed no negative flying qualities of the paragliders. These negative flying qualities were not registered by them in the period of critical flight, either.

D) The approximate difference in height between the glider parachute and the pilot is usually 6 m.

E) Just before the collision the pilots flew against each other with a small vertical separation. The flight test of Vega 2 type shows that basic (most common, optimal) speed of the paraglider is 39 km/hod.

F) According to the Regulation of LAA SR No LZ-1, Title 3, the provisions of the flight rules for this flight (counter-flight with a small vertical separation) do not allow an unambiguous decision which of the pilots was responsible for the escaping manoeuvre.

1.19 Useful or effective investigation techniques

Standard investigation methods were used.

2. ANALYSIS

The pilots had a permanent mutual visual contact during the whole flight. However both pilots did not sufficiently evaluate their vertical separation and continued the counter-flight in more or less the same height. The pilots did not realize the dangerous situation and failed to perform a manoeuvre to avoid the collision of their paragliders.

In the height of 150-250 m above ground level the paragliders crashed to each other.

The take-off area consists of a slanting grass area ended by a forest in the lower part, which does not continue with the same sloping profile as the meadow, but runs in a more horizontal direction. This forms a kind of natural barrier to pilots of paragliders, especially those with lower gliding range, and raises fears of overflying the forest area. Their actual terrain clearance above this forest namely rapidly decreases. This fact can be considered as decisive for the decision of the second pilot at the beginning of this forest to continue a horizontal flight, moreover when he planned to miss the other paraglider by underflowing the first pilot. By overflowing of this forest the terrain plunges rapidly, so that the paraglider safely gets over the valley where it can continue the free flight. Before collision during the free flight both pilots were flying one behind the other with lateral clearance. The second pilot visually evaluated the distance between the flying paragliders as safe. The first pilot made the first right-hand turn and had a visual contact with the second pilot. He also evaluated the mutual distance as sufficient, which is proved by the fact that he continued the turn and planned to increase his flying height in the expected climbing air current. In view of the low experience of both pilots from group flying it can be concluded that distances between them was probably larger than minimum determined distances (30 m, 50 m). Based on data from the flight test of the Vega 2 type it can be assumed with the highest probability that actual flight speeds of both paragliders were about 39 km/h. At the moment when the paragliders were flying against each other it represents the speed of 78 km/h (i. e. 21.6 m/s), at which the paragliders were approaching each other. It is also necessary to take into account that one paraglider was flying with the wind, which could mean an actual decrease or a decrease of the vertical ascent rate for this paraglider, and on the other hand the paraglider flying against wind could register a horizontal flight or a slight increase of flying height because it has already entered the area of assumed climbing air current, too. As it was the beginning of a flight in assumed climbing air current, we cannot assume the same effects of this air current on both paragliders, the more that these paragliders were in different flight modes before the collision. In the upshot these facts meant with the highest probability a decrease of the existing vertical separation. The low experience of both pilots could have negatively affect the estimate of vertical separation in case that they determined the difference in height visually according to the pilot's position and not comprehensively according to the parachute/pilot system. The difference in height of 6 m significantly decreases the vertical separation. The start of the turn by the first pilot and the continuation of horizontal flight by the second pilot caused a considerable decrease of the existing distance between the paragliders. In the last flight phase, i.e. when the paragliders were flying against each other, the collision in the air occurred, followed by a descent with one reserve parachute initiated by the second pilot. The maximum carrying capacity of the emergency parachute of the second pilot is 120 kg and this was loaded with total approximate weight of 185.3 kg (without consideration of air resistance effects), which finally meant a higher rate of descent and hence injury of both pilots. As the second pilot was wrapped in the parachute and in a system of ropes of the second pilot's paraglider, the first pilot was unable to use an emergency parachute and so he fell to ground first, hanging on the second pilot, following the contour line of the slope. He was followed by the second pilot who also fell to the ground along the contour line of the slope.

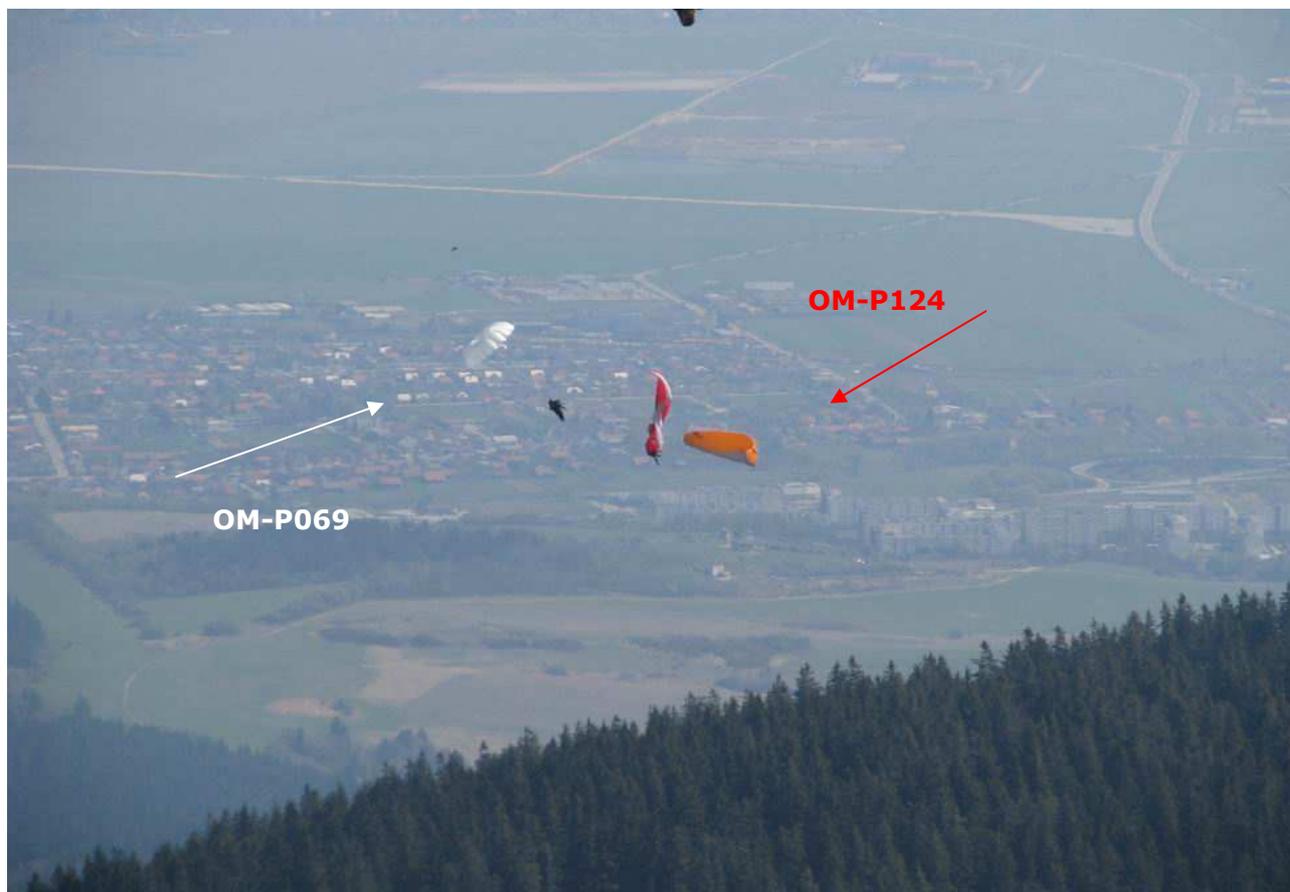
3. CONCLUSIONS / Cause of air accident

Main cause of air accident:

Collision of two paragliders during the flight.

Contributory factors:

- 1) Air proximity below determined limits (30 m, 50 m)
- 2) Missing practical experience from group flying



4. SAFETY RECOMMENDATIONS

Following the investigation of causes of the air accident of

Aircraft type: **VEGA 2XS** and **VEGA 2M**

Identification No **OM-P124** and **OM-P069**

Date of accident: **25.04.2010**

We recommend to implement the following measures:

1. Publication of results of investigation on the website of LAA SR

2. Analysis of the air accident at the level of the Paragliding Association of LAA SR (managed by the chief inspector of the association) with focus on the analysis of provisions of the Regulation LZ-1, Title 3 – Flight Rules

Bratislava, 27 May 2010