



**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: SKA2010001

FINAL REPORT

on air accident investigation

of paraglider **VEGA 2M**

Serial No: **23962606MC**

Date: 03.04.2010

Place: Horné Orešany

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 person
Type of operation:	general aviation
Type of aircraft:	VEGA 2 version M
Identification No:	not assigned, certificate of registration of paraglider issued by the Light Aircraft Association of the Czech Republic ("LAA CR")
Place of take-off:	Slepý Vrch, Horné Orešany
Place of landing:	Horné Orešany
Flight phase:	landing approach
Place of accident:	Horné Orešany, south-west from the municipality
	Geographic coordinates of the place of air accident: Starting point: Slepý Vrch 48°27' 29,2" N, 017° 24' 46,0" E Impact point: 48°27' 17,8" N, 017° 25' 38,8" E

Date and time of detection of accident: 03.04.2010, 12 h 19 min

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

B. INFORMATIVE SUMMARY

In the landing approach phase the parachute canopy of one-seat paraglider became deformed in a low terrain clearance and then fell to the ground in rotation from a low altitude.

The pilot was seriously 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 was conducting a sporting flight with start from the take-off surface of Slepý Vrch (in the proximity of the municipality of Horné Orešany). He started for this flight when he had executed preflight preparation without errors. The pilot evaluated meteorological conditions as good and suitable for a slope and thermal flying in given area. Several paraglider pilots were conducting flights in the area of Slepý Vrch at the same time. The pilot of the paraglider in question was conducting the flight without any negative signs or effects during the whole period of slope and thermal flying. Around the noon the pilot registered a change of meteorological conditions manifested by a changed effect of climbing air currents that caused a decrease of the flying height of the paraglider. By that time the pilot was flying in altitude of 100 to 300 m above ground level. Due to the change of meteorological conditions the pilot decided to land on selected suitable ground not far from the road No 502 connecting the municipalities of Horné Orešany and Dolné Orešany. When he approached the planned landing place, in altitude of 63 m above ground level the pilot registered slight effects of climbing air current. He interrupted the approach manoeuvre for landing and decided to continue the flight using the emerging climbing currents. In this phase he started a right-hand turn, whereby in the phase of downwind turn the paraglider lost the lift and the parachute became deformed. The paraglider started to approach the ground in rotation and steep downgrade. The pilot fell to the ground with the rear part of this body. He landed on a flat grass land from a height of 40 m in rotation and injured himself seriously.

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 3 April 2010.

1.2 Injuries to persons

Injury	Crew	Passengers	Other persons
Fatal	-	-	-
Serious	1	-	-
Minor	-	-	-
None	-	-	-

1.3 Damage to aircraft

The paraglider was 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:

Citizen of the Slovak Republic, 39 years old.

Holder of the PK-A pilot licence No: 4-1347, issued by the Light Aircraft Association of SR on 20 July 2007.

Qualifications: pilot of PK-B since 6 February 2008 with marked validity until 21 June 2009.

Medical certificate kept in aviation specialist records of LAA SR, of 21 June 2007, with validity until 21 June 2009.

Flying experience:

Total flying hours: 300 h 00 min

Of which for the previous 90 days: 03 h 24 min

Of which for the previous 90 days with this paraglider type: 03 h 24 min

Flying hours on the day of accident (including the critical flight) 00 h 38 min

1.6 Aircraft information

Type: one-seat paraglider VEGA 2 M

Serial No: 23962606MC

Year of manufacture: 2009

Manufacturer: AXIS PARAGLIDING, Czech Republic

Total flying hours from the year of manufacture: 20 h 00 min

Certificate of airworthiness No: Certificate of paraglider registration issued by LAA CR with marked validity until 16 June 2011 / 200 hours /.

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 17.0 kg

Total aircraft weight at the time of AA: **107,9 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 information

1), 2), 3)

	11:00 a.m.	12:00 noon	01:00 p.m.
Visibility	30 km	30 km	30 km
Wind (direction / speed)	160° / 3 m/s	140° / 3 m/s	180° / 4 m/s
Clouds / Base	3/8 / 1 500 m	3/8 / 1 800 m	2/8 / 1 800 m
Temperature	12,7 °C	13,9 °C	14,0 °C

1) Data for the Malacky airport

2) After 12:00 (noon) a fast decrease of atmospheric pressure of up to 0.5 hPa was registered. The pressure then decreased continuously until evening hours.

3) Meteorological conditions CAVOK.

1.8 Aids to navigation

Personal navigation device of the aircraft crew of Garmin GPS Map60 CSX type. Weight of device: 0.213 kg.

1.9 Communications

Not applicable.

1.10 Aerodrome information

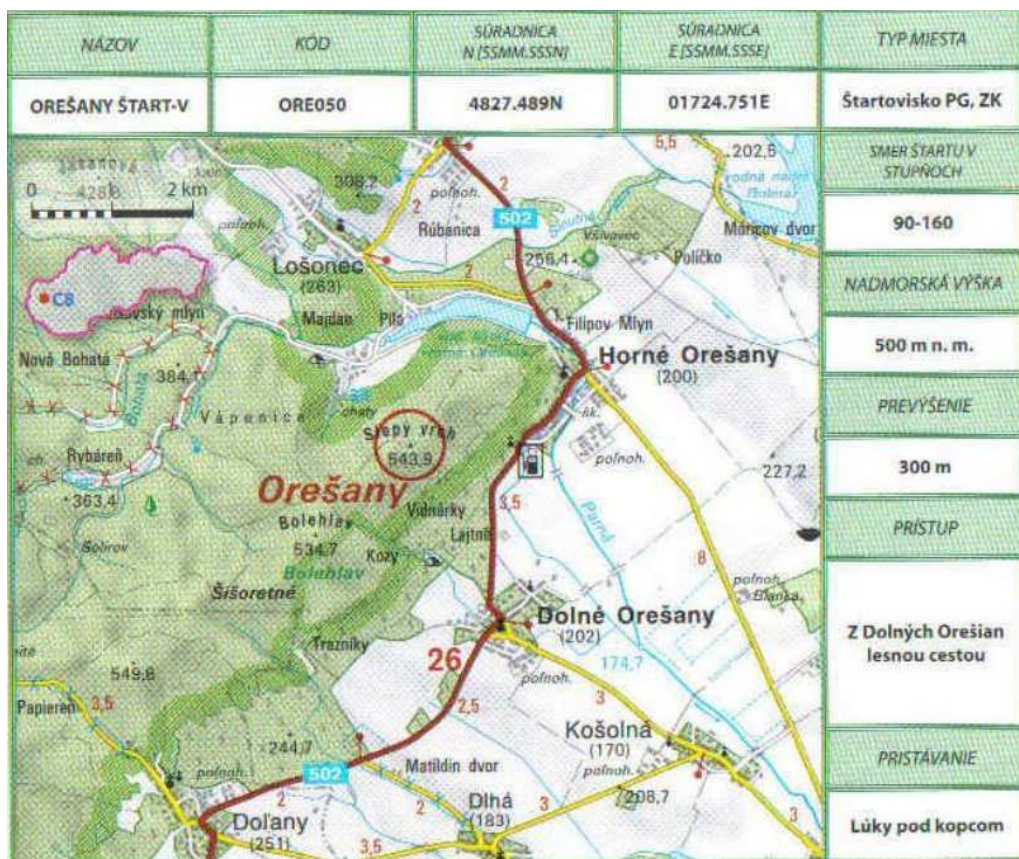
Slepý Vrch – take-off surface for parachute and hang gliders situated in the northern part of the Small Carpathians, approximately 4 km south-west from the municipality of Horné Orešany. The respective owner approved the use of the surface for the Light Aircraft Association of SR. The surface is a grass clear area deprived of trees, slanting toward the south. The condition of the surface allows its use for determined purpose. The top of the hill Slepý vrch is situated in the altitude of 543.9 m above sea level. The take-off surface itself is situated to the south-east from the hill top and bounded by trees. The suitable landing area is situated along the road No 502 that connects the municipalities of Horné Orešany and Dolné Orešany lying in flat grass and unbuilt areas.

1.11 Flight recorders and other recording systems

No flight recorders were used. Basic flight data could be observed using the device Garmin GPS Map60 CSX. The device was not damaged (it was functioning).

1.12 Wreckage and impact information

The point of impact of the paraglider with a pilot is situated in one third of the flat section of road No 502 slanting toward the south, approximately 30 m from its left verge (at the sight in the north direction). The impact point is situated in a flat grass area without obstacles.



1.13 Medical and pathological information

Due to the fall the pilot suffered a serious injury without negative effect on occurrence of consequences of the 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.

1.16 Tests and research

1) The flight data from the device Garmin GPS Map60 CSX were examined. No anomalies were detected during the flight, from the moment of start until the moment of fall. The analysis of the last flight phase revealed facts that are specified in paragraph 1.18.

2) The paraglider manufacturer was consulted and on the basis of this consultation it can be stated that the difference in the minimum flight speed within the range between the minimum load (85 kg) and the maximum load (110 kg) is 2 km/h. According to the basic aerodynamic calculation this speed for given conditions of the paraglider ($V_{min} = 23$ km/h, $M_{min} = 85$ kg, $M_{max} = 110$ kg) represents 2.75 km/h.

1.17 Organizational and management information

Not applicable.

1.18 Additional information

A) Data recorded by Garmin GPS Map60 CSX:

- 1) Start 48°27'29,2" N, 017°24'46,0" E, altitude 502 m above sea level, time 11 h 31 m 41 s;
- 2) From the start until 12 h 18 m 40 s the flight was without any anomalies and errors. The flying height was predominantly 100 to 300m AGL;
- 3) 12 h 18 m 41s, altitude 263 m above sea level (63 m above ground level), ground speed 3 km/h, course of flight approx. 90°, start of right-hand turn;
- 4) 12 h 18 m 45 s, altitude 260 m above sea level (60 m above ground level), ground speed 7 km/h, continuation of the right-hand turn;
- 5) 12 h 19 m 06 s, altitude 253 m above sea level (53 m above ground level), speed 13 km/h, continuation of the right-hand turn;
- 6) 12 h 19 m 16 s, altitude 254 m, speed 20 km/h, approximate position 270° toward the position set out in paragraph 3 above, continuation of the right-hand turn;
- 7) 12 h 19 m. 26 s, altitude 240 m above sea level (40 m above ground level), ground speed 29 km/h, continuation of the right-hand turn, which is not centric;
- 8) 12 h 19 m 31 s, altitude 200 m above sea level (0 m above ground level), continuation of the right-hand turn by approximately 180°, at the time 12 h 19 m 31s the paraglider crashes on the ground, ground speed 35 km/h.

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.

C) From statements of two witnesses observing the fall of the paraglider in the phase of paraglider flying 10 – 30 m above the ground level until its crash it can be concluded that the parachute of the paraglider had an inflated shape and was positioned behind the pilot and above the horizontal plane, whereby the observers registered rotation of the paraglider/pilot system. Both witnesses only saw the final phase of the fall.

D) From the statement of the pilot it follows that from the start of paraglider operation that he received as new in June 2009 he noticed no negative flying qualities of the paraglider. The pilot uses different variants of this paraglider type from one manufacturer. No deficiencies in the condition of the paraglider Vega 2M were found.

1.19 Useful or effective investigation techniques

Standard investigation methods were used.

2. ANALYSIS

The pilot was conducting a sporting flight with start from the hill Slepý Vrch (in the proximity of the municipality of Horné Orešany). He started for this flight when he had executed preflight preparation without errors detected on the paraglider Vega 2M. The pilot evaluated meteorological conditions as good and suitable for a slope and thermal flying in the area near the starting point. Several paraglider pilots were conducting flights in given area at the same time.

The pilot was conducting the flight without any negative signs or effects during the whole period of slope and thermal flying. Around the noon the pilot (as well as other pilots) registered a change in the effect of climbing air currents that caused a decrease of his (their) the flying height (by that time the flight was conducted in the height of 100-300 m above ground level. Afterwards the pilot decided for a flight to landing, for which he chose a suitable area near the road No 502 connecting the municipalities of Horné Orešany and Dolné Orešany. When he approached the planned landing place, in altitude of 63 m above ground level the pilot registered slight effects of climbing air current and suddenly decided to use these effects of climbing air current to continue the flight. In this phase he started a right-hand turn, whereby in the phase of downwind turn he registered a change in position of the parachute, subsequent rotation and sharp descent. During the whole descent he felt that the paraglider ropes were loose. He tried to regenerate the parachute but failed. In rotation the pilot continued the flight by a fall from the height of 40 m to the ground and just before the contact with the ground registered a tension of ropes on the left side of the paraglider. At the same time the pilot fell with his back on a flat clear grass surface. He started the turn at a speed of 3 km/h and this speed increased up to 35 km/h. The ground speed is recorded, so this speed is not a flight speed and depends on the course position of the paraglider and on the speed of rotation. According to the meteorological situation at given moment a wind direction of $140^{\circ} - 180^{\circ}$ and a wind speed of 3 – 4 m/s can be supposed. In the most favourable position of paraglider (flight against wind) it can be supposed that at that time of 12 h 18 m 41 s the maximum speed of the paraglider was 17.4 km/h. At given moment no rotation of the paraglider was registered, so the maximum flight speed with the highest probability was 17.4 km/h. The minimum flight speed for a paraglider Vega 2M is determined at 23 km/h. In case of the maximum paraglider loading of 110 kg the increase of this speed of 2 – 2.75 km/h can be estimated. For given flight the maximum take-off weight was 107.9 kg, which approaches the maximum permissible take-off weight. On this basis the increase of the minimum flight speed up to the value of 25 km/h can be estimated. These findings suggest that at the beginning of fall initiation the paraglider was flying at a speed 7.5 km/h below the minimum speed. This is probably caused by the unplanned decision of the pilot to continue the flight at the moment when he felt climbing air currents. At the time of 12:00 (noon) a significant step decrease of air pressure by 0.5 hPa was registered, which continued until evening hours and negatively affected the air stability at the moment of air accident. This change of pressure indirectly affects by a change of air density the generation of resultant aerodynamic force, i.e. by the need of another, though insignificant, increase of the flight speed in order to maintain the flight at the same load.

The beginning of the unfavourable flight can be situated in the moment when the flying height was 63 m above ground level. In this height the pilot starts to orientate himself and determine the flight speed according to the ground, i.e. to feel the speed in relation to the ground. During the flight in question the pilot did not use the speedometer for measurement of flight speed. Due to rotation it can be supposed that the pilot evaluated the ground speed as sufficient for the flight itself. With high probability he was holding the control ropes in a position that did not make him feel that he should increase the flight speed by slackening or fully releasing the control ropes. It is proved by the flight period of approximately 35s (from 12 h 18 m 41s to 12 h 19 m 16s), when a slight loss of flying height (9 m) was registered during a turn and the ground speed increased to 20 km/h. At the same time, more significant rotation of the parachute/pilot system was registered and the actual flight speed was still below the minimum flight speed. After the termination of this state a significant loss of height

from 40 m above ground level was registered, followed by a crash on the ground within 5 seconds. Just before the contact with the ground the pilot registered tension of ropes on the left side of the paraglider. This is most usually caused by an instinctive movement of hands as protection against the fall, whereby the pilot with the highest probability slackened the control ropes and the parachute tried to take the normal flight position, but the paraglider fell to the ground at the same time. The effect on air accident for the reason of airworthiness of the paraglider cannot be assumed. The prescribed parameters for take-off weights were observed.

3. CONCLUSIONS / Cause of air accident

Main cause of air accident:

Loss of flight speed.

Contributory factors:

Low flying height at the beginning of a manoeuvre of entry into the climbing air current.

4. SAFETY RECOMMENDATIONS

Following the investigation of causes of the air accident of

Paraglider type: **VEGA 2M**

Identification / serial No: **23962606MC**

Date of accident: **03.04.2010**

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).**
- 3. Determination of a binding measure - recommendation for the phase of landing approach from the minimum height of 100 m AGL with exception of cases of safety and emergency landing. The text of the measure should be published on the website of LAA SR as a permanent measure.**

Bratislava, 25 May 2010