



# Air Accident Investigation Unit Ireland

**ACCIDENT REPORT**  
**Nova Mentor M (Paraglider)**  
**Mt. Leinster, Co. Carlow, Ireland**  
**30 May 2010**



**Department of Transport  
Tourism and Sport**

*An Roinn Iompair  
Turasóireachta Agus Spóirt*



AAIU Report No: 2011-008

State File No: IRL00910037

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In accordance with the provisions of SI 460 of 2009, the Chief Inspector of Air Accidents, Mr. Jurgen Whyte, on 30 May 2010, appointed himself as the Investigator-in-Charge to carry out a Field Investigation into this Accident and prepare a Report. The sole purpose of this Investigation is the prevention of aviation Accidents and Incidents. It is not the purpose of the Investigation to apportion blame or liability.

**Aircraft Type and Registration:** Nova Mentor M (Paraglider) -  
No Registration

**No. and Type of Engines:** None

**Aircraft Serial Number:** 37222

**Year of Manufacture:** 2009

**Date and Time (Local):** 30 May 2010 at approximately  
13.05 hrs (Local)

**Location:** Mt. Leinster, Co. Carlow, Ireland  
N52°38' W006°47'

**Type of Flight:** Private (Recreational Sport)

**Persons on Board:** Crew - 1

**Injuries:** Crew - 1 (Serious)

**Nature of Damage:** Slight impact damage to seat plate

**Commander's Licence:** Nil

**Commander's Details:** Male, aged 43 years

**Commander's Flying Experience:** Approximately 100 hours

**Notification Source:** An Garda Síochána (Carlow)

**Information Source:** AAIU Investigation



## SYNOPSIS

While seeking to find a thermal<sup>1</sup> in the vicinity of Mt. Leinster, the paraglider spiralled down from a low level and impacted terrain heavily. The paraglider Pilot<sup>2</sup> sustained serious spinal injuries.

## 1. FACTUAL INFORMATION

### 1.1 History of the Flight

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The Pilot arrived on-site (a location known as Black Banks northeast of Mt. Leinster) at approximately 11.00 hrs with the intention of conducting a cross-country flight. He set up his equipment, met up with some friends and over a period of approximately one and a half hours they tried to find suitable thermal conditions, but failed. The Pilot landed at approximately 12.50 hrs to await better lift conditions. On seeing some of his friends acquiring lift from a thermal, he got airborne again (approximately 12.56 hrs) and some minutes later entered a thermal and subsequently started to circle.

Shortly thereafter, at approximately 13.05 hrs, the Pilot was seen to spiral down to the ground from a low level close to the ridge on the north-eastern side of Mt. Leinster. Other pilots operating in the general vicinity, while not seeing the actual impact, observed that the Pilot was on the ground and was not moving. Attempts were made to contact the Pilot by radio, but he did not respond. Another pilot then landed close to the Pilot and found him lying on his side and unable to move his legs. The emergency services were contacted and the Pilot was airlifted from the accident site to hospital. The site was secured by An Garda Síochána (Borris Garda Station) pending the arrival of the AAIU. Two Inspectors of Air Accidents arrived on-scene at approximately 18.00 hrs, conducted an examination of the impact site and recovered the Pilot's equipment and personal belongings.

### 1.2 Personnel Information

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The Pilot was a Polish national and had been flying paragliders in Ireland for approximately 3 years. He did not complete a formal flying course nor did he receive formal training on paragliders. He was self-taught, was not a member of a club or association and as such did not hold a paraglider rating. Formerly, he was a military paratrooper with 2 years' experience and had logged a total of 38 jumps. He purchased a variometer (Vario) in 2009 (**See Section 1.5.4**) and during that year he recorded a total of 50 hours flight time. During 2010 and up to the time of the accident, he had recorded 35 hours. In total he estimated that he had approximately 100 hours flight time on paragliders.

### 1.3 Interviews

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#### 1.3.1 Pilot

The Pilot was interviewed in hospital approximately one month after the accident. The interview was conducted through an interpreter, a close friend and fellow paraglider pilot. The Pilot was very frank throughout the interview. He stated that he had purchased the paraglider as new from a certified Polish dealer one year prior to the accident and that it had not been modified. The canopy had been tested in Poland (**See Section 1.4.3**) some weeks prior to the accident and everything was ok. The Pilot considered that the paraglider was easily controlled and that it had no fault on the day of the accident.

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1 **Thermal:** Column of rising air in the lower altitudes of the Earth's atmosphere.

2 **Paraglider Pilot:** Hereafter referred to as the Pilot.

Specific to the accident flight he stated that he had found a thermal and had started to circle. He considered that he wrongly estimated his altitude and whilst coring<sup>3</sup> he realised that he was too low crossing the mountain ridge.

He pulled on the brakes<sup>4</sup> on one side to widen out the circle. After pulling the brakes he believed that the paraglider made three turns to the right. He impacted and lost consciousness. He regained consciousness face down and saw a colleague approaching. He observed that his lines were twisted and considered that one should not get into a situation like this unless speed is low.

### 1.3.2 Witnesses

A number of paragliders were operating in the area on the day of the accident and these pilots were subsequently interviewed by the Investigation. They stated that generally, the weather conditions experienced were: Good visibility, cloud base well over the Mt. Leinster TV mast with an average wind of between 8-10 mph. First bubbles<sup>5</sup> appeared around 12.30 hrs but they were weak and very hard to stay in. Shortly afterwards the bubbles turned into regular thermals, however, they were not fully formed, especially close to the slope.

Witnesses reported seeing the accident Pilot on his first flight flying well along the ridge and out into the valley many times, high most of the time and in control of his paraglider.

With regard to the accident flight, a number of paragliders had planned a cross-country and had climbed to the cloud base above the mast. The remaining paragliders, including the accident Pilot, were seeking thermals in order to join the others above. One of the climbing paragliders made a 180-degree turn and headed back down the ridge. On glancing to his right he saw the accident Pilot's paraglider, which was operating close to the ridge, pitch 90 degrees forward and spin (right), into the mountainside from approximately 50 ft over the ground.

### 1.3.3 Video Evidence

One of the paragliders was carrying a video recorder, which contained footage of some of the day's flying. From time to time the accident Pilot was recorded in passing flight. Just prior to impact, the accident Pilot is seen to be paralleling the north-eastern slope of Mt. Leinster, with the rising high ground on the left side and the ridge valley on the right side. In the video the Pilot is seen to commence a slow right turn away from the rising high ground on the left. The later loss of control and final impact sequence was not recorded.

## 1.4 Weather

Around the time of the accident, the Met Éireann weather station at Oak Park, in Carlow, reported a 5 kts northerly wind and fair weather, with a temperature of 16°C. The weather station on Mt. Leinster reported a west-north-west wind of 7 kts with an air temperature of 12.7°C. The temperature difference between the two stations, at different altitudes, suggests an environmental lapse rate conducive to the formation of light thermals.

3 **Coring:** Once a pilot finds a thermal he or she begins to fly in a circle, trying to centre the circle on the strongest part of the thermal (the "core") where the air is rising the fastest.

4 **Brakes:** In general used to stay in the core of the thermal at reduced speed.

5 **Bubbles:** When the sun heats pockets of air close to the ground it generates thermal activity. The warm air rises as an invisible bubble until it usually reaches dew point height and forms a cloud. The concentration of bubbles will determine the thermal activity and level of lift achieved.



## 1.5 Technical Information

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### 1.5.1 Paraglider General

Paragliding is a recreational and competitive flying sport. A paraglider is a free-flying, foot-launched craft. The pilot sits in a harness suspended below a fabric wing whose shape is formed by its suspension lines and the pressure of air entering vents in the front of the wing.

### 1.5.2 Details

Canopy Type Designation:	Mentor M
Canopy Manufacturer:	Nova
Serial Number:	37222
Date of Production:	01/06/2009
Classification:	DHV 1-2 GH
Harness Type Designation:	Up Pamir
Harness Manufacturer:	Up Europe GmbH
Minimum Weight in Flight:	90 kg
Maximum Weight in Flight:	110 kg

### 1.5.3 Weight Range

The maximum all up weight (MAUW) of the paraglider is 110 kg. The Pilot weighed approximately 88 kg and the canopy/equipment weighed 20 kg, giving an operating weight of 108 kg, which is towards the top of the weight range.

### 1.5.4 Paraglider Control

Control lines held in each of the pilot's hands connect to the trailing edge of the left and right sides of the wing. These controls are called 'brakes' and provide the primary and most general means of control in a paraglider. The brakes are used to adjust speed, to steer (in addition to weight-shift) and to flare during landing. In addition to manipulating the brakes, a paraglider pilot must also lean (weight-shifting) in order to steer properly. A foot control (speed bar/accelerator) is attached to the paraglider harness and connects/influences the A-, B- and C-risers of the paraglider wing through a pulley system. This control is used to increase speed and does so by decreasing the wing angle of attack.

## 1.6 Technical Examination

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### 1.6.1 General

A significant amount of equipment, including, the canopy/stuffsack (bag), harness, reserve chute, helmet, radio, Vario and personal effects were recovered from the accident site by the AAIU and were subsequently examined and tested by the Investigation.

An initial examination of the Pilot's harness and canopy was conducted on the 22 June 2010 at the AAIU examination facility at Gormanston, Co. Meath. The Investigation was assisted by two experienced paraglider pilots from the Irish Hang Gliding and Paragliding Association (IHPA).

### 1.6.2 Harness

Impact damage was found at the front left-hand corner of the seat plate. The right hand side (RHS) shoulder strap and foot stirrup were found cut. This is consistent with and is attributed to the rescue effort by the emergency services in the recovery of the injured paraglider Pilot. The harness was suspended and 'hang tested' to verify pilot sitting position. This was found to be satisfactory.

### 1.6.3 Canopy (Wing)

One line inside its protective sheath was found damaged and possibly broken. The canopy inflated cleanly and without any visible asymmetry. Stretching of some of the canopy suspension lines was found, however they were in general symmetrical. The initial physical line measurements did not fully conform to the published data for the canopy line plan. As such a decision was made by the Investigation to seek a second technical opinion on this matter.

The canopy was taken to an approved maintenance and repair facility in the United Kingdom and a full examination of the canopy was conducted under the supervision of an AAIU Inspector.

The examination indicated that the canopy was given a general glider condition rating of "Good". The lines were considered to be okay and normal. Main brake lines seemed to be too short and had different lengths on both sides. Normally this will not affect flight; however it was stated that this could be a problem particularly if there is an overreaction. A knot on the brake-line was not standard and indicated that the main brake lines had been adjusted before.

The measurements of the lines were made available to the manufacturer and the manufacturer confirmed that the measurements were quite normal for that canopy type. The brake lines were considered shorter than target value. For an inexperienced pilot the reduced brake travel could make an induced stall more likely. Normal brake travel to stall is 75 cm. On the incident canopy, the travel was reduced by about 8 cm, which was considered by the manufacturer to be not too much of a reduction.

### 1.6.4 Maintenance

A technical certificate was found by the Investigation in the Pilot's paraglider 'stuffsack'. This certificate identified that the paraglider was sent to an approved maintenance facility in Poland on the 9 March 2010 and was certified and signed off by an Inspector as "Fit for Flight". The certificate was valid until 8 March 2012.

### 1.6.5 Variometer (Vario)

#### 1.6.5.1 General

The Pilot was carrying a Brauniger IQ Basic/Global Positioning System (GPS) Vario and this equipment was subsequently downloaded by the Investigation. The Vario is an instrument used to inform the pilot of the near instantaneous (rather than average) rate of climb or descent. In paragliding, this hand-sized instrument is used almost continuously during normal flight to inform the pilot of rising or sinking air while he/she searches for thermals.

Most electronic Varios (as in this case) generate a sound whose frequency and pitch depends on the instrument reading. Typically the audio tone increases in frequency as the Vario shows a higher rate of climb and decreases in frequency towards a deep groan as the Vario shows a faster rate of descent. When the Vario is showing a climb, the tone is chopped, and the rate of chopping increases as the climb rate increases. During a descent the tone is not chopped



The Vario presents other information, for example, position, bearing, distance, height, flight time, etc. The Vario manufacturer was asked by the Investigation to comment on the accuracy of the recorded readings on the unit and responded that, "Air accidents are very difficult to explain by using a (Vario) flight recorder".

### 1.6.5.2 Examination of Vario

An examination of the Vario determined that the Pilot had flown two flights on the day of the accident. The first commenced at 11.13:38 hrs and terminated at 12.49:12 hrs, a duration<sup>6</sup> of approximately 1 hour and 35 min. The second flight (the accident flight) commenced at 12.56:44 hrs and terminated at 13 hrs 05 min, a duration of 8 min 39 sec.

Specific to the second and final flight, it was determined that the start height was 1,624 ft, the max height achieved was 2,139 ft and the height at impact was 1,936 ft. The impact height was verified against an independent GPS measurement of 1,938 ft at the accident site. Further analysis of the flight profile determined the following:

For 6 min 30 sec the paraglider maintained a gradual climb, with some ascents up to a height of 1,988 ft. Approximately 14 sec before impact the Vario records a sudden climb of 151 ft in 2 seconds to a maximum height of 2,139 ft. This equates to a rate of climb (ROC) of 4,530 ft/min or 23 m/sec. Over the next 10 seconds the Vario records a gradual descent of 115 ft down to 2,024 ft, a rate of descent (ROD) of 690 ft/min or 3.5 m/sec. The final 2 seconds of flight records a sudden descent of 88 ft to ground contact at 1,936 ft, a ROD of 2,640 ft/min or 13.41 m/sec.

**Note:** *The Investigation notes that whilst the vast majority of the Vario recorded readings are consistent and realistic, the final readings, though consistent with the general character of the event as described by the Pilot, are of unrealistic magnitude e.g. rate of climb in excess of 4,500 ft/min. So, whilst the Investigation accepts that the actual values of the final readings are not realistic, the general character of the reported stall event is consistent with the trend of the final readings.*

The Vario records and indicates the average value of climb or sink rate within the adjusted time span of flight. For the accident flight the unit recorded a maximum ROC of 2.9 m/sec and maximum ROD of 3.8 m/sec.

The Vario was not fitted with a wind vane speed sensor; as such only the speed over the ground (GPS speed) was displayed and recorded. The recorded data does suggest that the GPS ground speed reduced suddenly to near zero over the final 10 seconds of flight.

## 1.7 Safety Regulation and Licensing

The European Aviation Safety Agency (EASA) is the agency of the European Union for aviation safety. The agency became operational in 2003 pursuant to European Parliament and Council Regulation (EC) 1592/2002, now repealed by EC 216/2008, referred to as the Basic Regulation.

The Basic Regulation sets out the substantive requirements under Chapter II, Article 4, the Basic Principles and Applicability. Paragraph 4(4) identifies that Paragraph 1 shall not apply to aircraft referred to in Annex II. Annex II identifies under (g) gliders with a maximum empty mass, of no more than 80 kg when single-seater or 100 kg when two-seater, including those which are foot launched. As such foot-launched paragliders are excluded from these requirements and national regulations apply instead.

<sup>6</sup> The Vario can record some activity prior to take-off. Take-off is automatically recorded. The unit also recognises autonomously the end of the flight. The basic condition being that neither speed over ground has been measured at greater than 10 km/h during minimum 60 seconds nor that the Vario has indicated to more than 0.1 m/s.

The licensing requirements of the Irish Aviation Authority (IAA) are such that various forms of gliders, (i.e. sailplanes, hang-gliders, paragliders, gyrogliders) are exempt from any pilot licensing requirements when operated internally in Ireland and as a "Private Aircraft", i.e., aircraft used for recreational pleasure flying and not used for hire or reward. However, the IAA's 'Safety Regulation – Gliders' web site page emphasises and strongly recommends that no person should fly or attempt to fly these aircraft without receiving the full course of appropriate training provided or approved by the relevant sport aviation association covering these aircraft. It also warns that failure to receive such training may result in serious injury or loss of life, as well as damage to aircraft or property.

### 1.8 Sport Aviation Clubs/Associations

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The National Aero Club of Ireland (NACI) is the governing body for all air sports in Ireland and is a member to the FAI (Fédération Aéronautique Internationale) the world air sports federation. The NACI is also affiliated to Europe Air Sports and is a member of the Irish Sports Federation.

The IHPA is recognised as the National Association for the sports of hang-gliding, paragliding, paramotoring and powered hang-gliding in Ireland and is affiliated to the NACI.

### 1.9 Training

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A Registered Training Facility (RTF) is an organisation staffed, equipped and operated in a suitable environment, offering flight training. Regardless of aircraft type, all organisations offering flight training in Ireland must be registered with the IAA. One such IAA approved RTF is based in Co. Tipperary and provides certified training for paragliders and paramotors.

### 1.10 Emergency Response

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A colleague of the Pilot made a 999 call (13.32 hrs) from the mountainside indicating a serious injury. An Irish Coast Guard Helicopter was dispatched from Waterford Airport and arrived on scene at 14.08 hrs and landed near the casualty at 14.14 hrs. Following stabilisation of the Pilot, the helicopter routed to a landing site in Wexford where the Pilot was off-loaded (15.14 hrs) into an ambulance for transfer to Wexford General Hospital.

## 2. ANALYSIS

### 2.1 The Accident

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The Pilot had flown successfully for 1 hr and 35 min on the flight immediately prior to the accident flight and was observed to be flying well and in control of his paraglider. It was reported by other paragliders that the first bubbles appeared around 12.30 hrs; they were weak and very hard to stay in. Shortly after the bubbles turned into regular thermals, however, they were not fully formed, especially close to the ridge. The Pilot landed from his first flight at 12.50 hrs. However, on seeing other paragliders' acquiring thermal lift over Mt. Leinster, he got airborne again (12.56 hrs) in an attempt to join them for the planned cross-country.

An eyewitness account indicates that the Pilot was operating parallel and close to the ridge, when the paraglider pitched 90 degrees forward, and spun (right) into the mountainside from a height of approximately 50 ft over the ground.





In his post-accident interview the Pilot considered that he wrongly estimated his altitude and whilst coring he realised that he was too low crossing the ridge. He pulled on the brakes on one side to widen out the circle. The Pilot recalled that after pulling the brake, the paraglider did *'some kind of three turns to the right'*.

The Investigation is thus satisfied that the Pilot was coring close to the mountain ridge just prior to losing control. In an attempt to stay in the thermal core, it is possible that the Pilot slowed the paraglider down, through braking, close to the stall. While this makes it easier to stay in the thermal, it also increases the risk of stalling and/or spinning. The reported pitch forward is an indication that the paraglider possibly encountered sinking air or a sudden reduction in the prevailing wind or a reduction in airspeed.

If excessive (*right*) brake was applied at a speed near to the stall point, the paraglider would have spun on its yaw axis, with one wing flying forward, one flying backwards. This would result in decreasing the airspeed of the wing and thus inducing a partial stall of the wing (right side) with a closure and deflation of the right side wing. This results in a spin to the right with the wing partially deflated. The slightly shortened braking lines would have exacerbated the braking demand.

The loss of a properly functioning wing means that the paraglider would experience a high sink rate<sup>7</sup>. The 13 m/s value during the final 2 seconds is consistent with an uncontrolled spin of a paraglider or loss of control with a wing partially deflated. The downloaded data indicates a sudden vertical descent from approximately 88 ft at decreasing GPS groundspeed to near zero speed during the final phase of flight.

In addition, it cannot be ruled out that the lines, in the final descent, may have become twisted between the Pilot and the paraglider thereby locking up the brakes. The fact that the Pilot was operating in close proximity to terrain at the point of loss of control, allowed insufficient time/space for the Pilot to affect an appropriate recovery manoeuvre.

## 2.2 Discussion

The Pilot, who suffered serious spinal injuries, was in paragliding terms relatively experienced with over 100 hrs flight time. However, he was self-taught and did not receive any formal training. The benefit of formalised structured training with an instructor on a certified course is that all aspects of the approved flight envelope will be presented to the student and recovery techniques discussed and practiced. For self-taught individuals, it is possible that they may not fully appreciate the technical limitations of their paraglider, in particular, in relation to the flight envelope and stall speeds/ characteristics, as well as recovery techniques, meteorological phenomena and risks associated with flying close to mountainous terrain.

The Investigation recognises the difficulty of regulating an activity such as recreational sport aviation and indeed, from an International and European perspective, there is no requirement to regulate such activities at present. Notwithstanding this, the reality is that recreational activities such as paragliding, power paragliding, hang gliding, power hang gliding, etc., are relatively cheap and easy to access, yet present a high element of risk if appropriate training is not acquired. Apart from the risk of personal injury or death to the individuals engaged in such activities, there is a possibility that any miss-use could present a danger to other aviation users as well as members of the general public.

<sup>7</sup> Negative spins have recorded sink rates up to  $-5\text{m/sec}$  (984 ft/min).

The Investigation is aware that the IAA is seeking to develop and establish a General Aviation Safety Council for Ireland. The purpose of such an entity is to further improve communications between the IAA and the General Aviation Community and help identify the areas of greatest safety concern in order to reduce the risk to the flying community and all stakeholders. The AAIU is fully supportive of such an initiative and considers that once formed the General Aviation Safety Council would be an appropriate forum to discuss safety issues related to recreational sports aviation activities.

### 3. CONCLUSIONS

#### (a) Findings

1. The weather conditions at the time of the accident were suitable for paragliding activity.
2. The Pilot was coring close to terrain, possibly at low speed, prior to losing control.
3. Following application of brake for a right turn, the paraglider was observed to pitch forward and enter a spiral descent to the right.
4. The application of excessive braking near the stalling point would have resulted in a decrease of airspeed over the wing, resulting in a partial stall on the right side with a closure and deflation of the right side wing. This would have resulted in a spin to the right with the wing partially deflated.
5. The Pilot impacted terrain from a height of approximately 88 ft and suffered serious spinal injuries.
6. While relatively experienced in the recreational sport aviation activity of paragliding, the Pilot had not received formal training and as such may not have fully appreciated the technical limitations of the paraglider, in particular, in relation to the flight envelope and stall speeds/ characteristics.

#### (b) Probable Cause

Loss of control while manoeuvring close to the stalling point.

#### (c) Contributory Factors

1. Proximity to terrain allowed insufficient height to affect a recovery following loss of control.
2. A lack of formal training.

### 4. SAFETY RECOMMENDATIONS

This Investigation does not sustain any Safety Recommendation.

- END -

**In accordance with Annex 13 to the International Civil Aviation Organisation Convention, Regulation (EU) No 996/2010, and Statutory Instrument No. 460 of 2009, AIR NAVIGATION (NOTIFICATION AND INVESTIGATION OF ACCIDENTS, SERIOUS INCIDENTS AND INCIDENTS) REGULATION, 2009, the sole purpose of these investigations is to prevent aviation accidents and serious incidents. It is not the purpose of any such accident investigation and the associated investigation report to apportion blame or liability.**

**A safety recommendation shall in no case create a presumption of blame or liability for an occurrence.**

Produced by the Air Accident Investigation Unit

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