

British Hang Gliding and Paragliding Association

REPORT

**Investigation of a Paramotoring incident
which occurred at Selsey, West Sussex,
on 22nd March 2016
in which the pilot suffered fatal injury.**

Introduction

On Tuesday 22nd March 2016 the British Hang Gliding and Paragliding Association (BHPA) received reports of an air incident at Selsey, West Sussex that had resulted in the death of the pilot. The BHPA tasked Mr David Thompson, BHPA Senior Technical Officer, to investigate the incident and submit a report to the Flying and Safety Committee (FSC) of the BHPA for ratification.

BHPA investigation serial number: IR GBR-2016-3462

Summary

At approximately 5.00pm on the afternoon of Tuesday 22nd March 2016, in the Selsey area of West Sussex, a male paramotor pilot lost control of his Dudek Hadron XX/ Macfly 250 paramotor and crashed sustaining fatal injuries. The pilot was a BHPA member and held a BHPA 'Pilot' rating in the hill and power environments. The Investigation concluded that the incident occurred as a result of the pilot failing to follow the procedure for safe operation of the glider's trimmers in accordance with the manufacturer's user manual. This resulted in the pilot losing control of the glider at a height from which recovery was unlikely, particularly when the glider was being flown close to the maximum recommended weight, despite the fact the pilot managed to deploy his emergency parachute.

This document is confidential until ratified.

Date ratified by the BHPA Flying and Safety Committee: 10th October 2016

THE STRUCTURE OF THE REPORT

The structure of this report conforms to that recommended in the BHPA Technical Manual and is intended to follow the principles pertaining to AAIB reports. It is divided into five sections.

Section 1 - Factual information

Section 2 - Analysis

Section 3 - Conclusions

Section 4 - Safety Recommendations

Section 5 - Appendices

SECTION 1 - FACTUAL INFORMATION

1.1 History of the flight

At approximately 3.30pm on the afternoon of Tuesday 22nd March 2016, two paramotor pilots met at the take-off field behind the house owned by Pilot A in Earnley, West Sussex. It was their intention to attempt a 100km closed circuit speed record, which involved flying round a predetermined course. Pilot A and Pilot B checked their equipment in accordance with their usual pre-flight check routine. Pilot A asked Pilot B to wait for him, as he wanted to make sure his controls aka “brakes” setup was correct. He had recently shortened the controls to enable a better flare when landing the glider. Pilot B then checked Pilot A’s data logger that was located in the side pocket of his harness. Pilot B confirmed to Pilot A that the logger was on and recording.

Pilot B then went back over to his own machine and prepared to take off. Pilot A ground handled his wing and shouted to Pilot B that he would catch up ‘if his brakes were feeling good’. It was their intention for Pilot B to take off first in order that he could relay weather and wind information along the planned route back to Pilot A.

Having finished his pre-flight checks, Pilot B took off at 16.55. He had no further contact with pilot A.

Pilot A took off at 16.58. He gained height as he circled in a clockwise direction until following a south easterly course towards Selsey. At this point Pilot A was flying at a speed of approximately 50kph and at an altitude of approximately 165m (540ft). At 17.02 Pilot A switched off the Garmin GPS unit.

At approximately 17.03 Pilot A lost control of his wing and was seen by witnesses to be in a ‘spiral’ type descent. Pilot A deployed his emergency parachute moments before crashing on an area of raised ground, approximately 1.2km south of the point at which the Garmin GPS was switched off.

Walkers, who had witnessed the incident, immediately notified the emergency services and quickly attended Pilot A. The emergency services arrived shortly after but were unable to save the pilot who was later pronounced dead.

1.2 Injuries to persons

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

1.3 Personnel information

Pilot A was a 42 year old male. He weighed approximately 115kg. He joined the BHPA in 1999 and held a BHPA ‘Pilot’ rating in the paragliding ‘hill’ and ‘power’ environments. He began flying powered paragliders approximately 6 years ago. His exact flying hours are unknown but are thought to be in the region of 200-300 airtime on powered paragliders. Pilot A was a current member of the British paramotor team and had competed with the team in Hungary in 2015. Pilot A was also the current UK record holder for speed over a 100km closed circuit.

1.4 Aircraft information

The aircraft was a combination of a Dudek Hadron XX size 22 glider (Serial Number P-121421) and a Macfly 250 paramotor using a Polini 250 engine. The glider was manufactured in July 2015 and had been purchased new by the pilot in August 2015. The take off weight range for the glider is stated by the manufacturer as 110-160kg. The Hadron XX holds French DGAC certification issued by the manufacturer. It has not been flight tested under the European Standard EN 926 – 2.

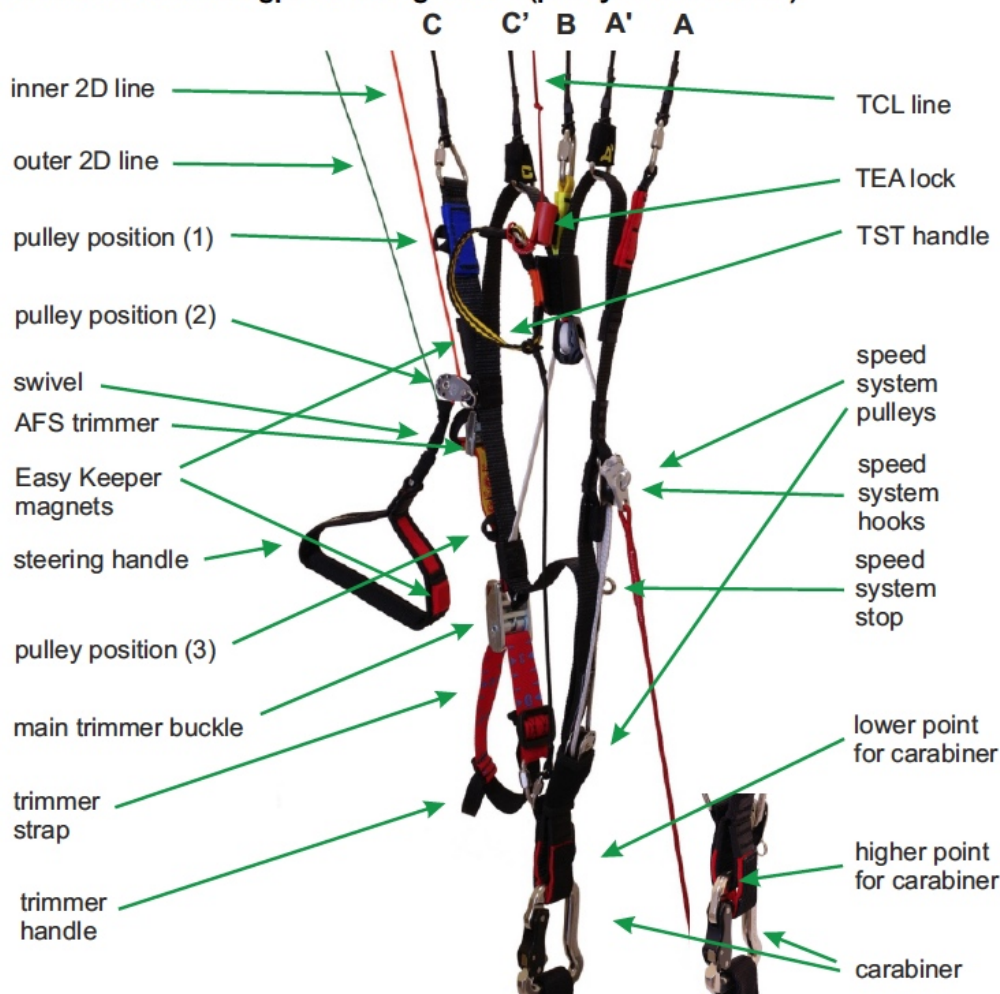
The engine and harness combination were weighed and found to be 49kg including the remaining fuel. The engine had been modified slightly to include an extra cooling system and it is known that Pilot A had been experimenting with different jetting configurations to maximise the efficiency of the engine. The engine was examined following the incident and found to be in good working order. The pilot was carrying a Gin Yeti 50 emergency parachute. The parachute had been deployed during the incident. On examination it was found to be in good condition.

The Dudek Hadron XX is a small wing with a relatively high wing loading compared to other paragliders, which has been designed for high speed. It is specifically aimed at pilots with a significant amount of experience. The manufacturer's user manual for the Hadron states that it is "fast and agile" and intended for pilots with "...at least 100 hours paramotor time" who fly cross-country and take part in competitions. It has a complex system of trimmers and control lines designed to maximise the efficiency of the wing. As well as the main trimmer, which is designed to open up the speed range of the glider by altering the angle of attack of the wing, the Hadron also has a second set of trimmers known as the "Aerodynamical Flaps System" or 'AFS'. These AFS trimmers are designed to slow the glider still further to enable the Hadron to be launched and landed more easily, given the high wing loading and associated high air speed of the glider.

The diagram below shows the arrangement of the risers on the Hadron XX.



Risers in lower hangpoint configuration (pulley in the middle)



The Hadron user manual makes it clear that the correct configuration of the trimmers, and in particular the AFS trimmer, is critical and that incorrect setting can result in violent collapses. The very first page of the manual is taken up by a warning highlighting the importance of the configuration setup and draws particular attention to the AFS trimmers. This page is included in the appendix, as is a link to the whole manual. Throughout the manual there are numerous references to the riser set up and the importance of correct configuration. From 26th March 2016, Dudek began supplying the Hadron XX with AFS-2 risers. The AFS-2 system prevents the main trimmers from being activated whilst AFS is engaged.

1.5 Meteorological information

An “aftercast” for the area was obtained from the Met Office via the Air Accident Investigation Branch. The aftercast stated that the weather for the area at the time of the incident was very good with light winds and excellent visibility. The aftercast was in line with the weather conditions as noted in the evidence from witnesses at the scene.

1.6 Flight recorders

A Garmin 78s GPS unit, a Flytec 6005 barometric variometer and an EW Avionics micro recorder were recovered from the scene. They were taken to the Air Accident Investigation Branch (AAIB),

Department for Transport in Farnborough for analysis. The results are discussed in the 'Analysis' section of this report.

1.7 Wreckage and impact information

The incident occurred in the Medmerry nature reserve, just north west of Selsey in West Sussex. The immediate area comprises mainly of marsh with interconnecting streams and inlets that flood with the tide. The exact impact location occurred on an area of raised ground that is not affected by the tide.

See Photo 1 below.



1.8 Medical and pathological information

Cause of death was given as 'internal injuries'.

SECTION 2 – ANALYSIS

2.1 The Investigation considered the experience of the pilot.

Although the exact number of flying hours attained by Pilot A are unknown, anecdotal evidence suggests that his paramotoring hours were in the region of 200 to 300. This is in addition to the hours he would have attained flying unpowered paragliders in the years before he gained his 'power' rating. Pilot A was the current UK holder of the 100km closed circuit speed record and had narrowly missed out on the world record. These attempts had been carried out on the Dudek Hadron XX glider. Pilot A was fully aware of the complexities of the Hadron and understood the importance of correctly setting the AFS trimmers. The Investigation does not consider the experience of the pilot to have been a factor in this incident.

2.2 The Investigation considered the evidence from the flight instruments carried by Pilot A.

The units were taken to the AAIB in Farnborough for analysis. All three units were found to be in perfect working order. Flight data for the incident flight was recorded as follows: The Flytec recorded a maximum average climb rate of 4.3m/s, a maximum average sink rate of 21.5m/s (48mph) and a maximum height of 580ft. The EW micro recorder was switched on at 16.35 and then switched off at 16.55. The trace clearly shows the unit was not operational during the flight and that it was switched off prior to flight. The Garmin

GPS unit was switched on at 16.30 and was subsequently switched off at 17.02. It shows that Pilot A took off at 16.58, three minutes after the micro recorder had been switched off. The Garmin recorded a maximum speed of 57 km/h before slowing slightly to 50km/h just prior to the unit being switched off. There is no indication from the GPS that Pilot A experienced any difficulties for the period of the flight that it was recording data. The picture below shows the GPS track taken by Pilot A and the point at which the unit was switched off. This was approximately 1.2km short of the actual incident site.



The position of the EW micro recorder in the harness means that it could not be deliberately switched on or off in flight. While accidental switching off can not be completely ruled out, it is highly unlikely as the on-off button must be pressed firmly twice in order to switch the unit off. The Garmin GPS unit was sited on Pilot A's flight deck and as such was on his lap while in flight. It would have been impossible for this to be switched off accidentally as the on-off button must be pressed firmly for over a second to switch the unit off. It is the opinion of the Investigation that both units were switched off intentionally and that Pilot A had abandoned his record attempt. While it may be speculation, the most likely reason is that Pilot A had decided to carry out a test flight to ensure the proper running of his engine unit and/or to ensure the brake lines had been correctly adjusted.

2.3 The Investigation considered the Dudek Hadron XX glider.

The combined weight of the pilot and his equipment is calculated to be to be at least 10kg over the top of the manufacturer's specified maximum take off weight. This high wing loading would make the glider very responsive to control inputs. Additionally, it may exhibit dynamic responses to departures from normal flight and to control actions made to recover the glider from such departures. The Investigation finds the highly loaded wing may have been a factor in this incident.

An inspection of the glider was carried out with the aid of the UK importer, Skybound Aviation Ltd, based in Swindon. The glider was examined in its incident state - with the controls configured as they had been found at the incident scene.

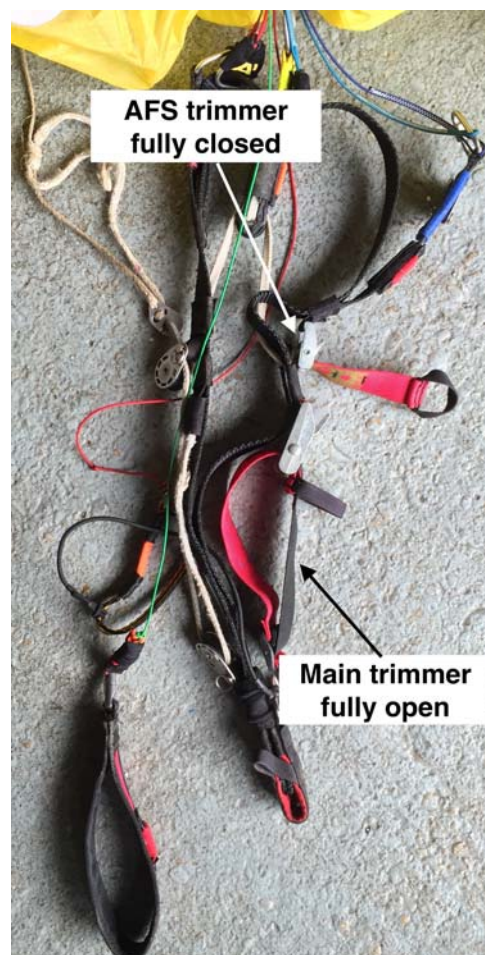
The brake lines were measured and found to be 30mm shorter than standard factory setting. However the manufacturer confirmed that 30mm was still well within the tolerance for the glider and is not considered a factor in this incident.

Upon inspection it was apparent that the trimmers were not set in accordance with the manual. Both AFS trimmers were fully closed, while both main trimmers were fully open. The photos below show the trimmer settings on the incident glider during inspection.

Left side riser set.



Right hand riser set.



The manufacturer's user manual for this glider draws the user's attention to the instability of the glider when the AFS trimmers and the main trimmers are set incorrectly. The manual specifically identifies the trimmer configuration in which the incident glider was set as being hazardous, possibly leading to violent / dynamic collapses.

With the AFS trimmers activated as they had been found to be during the incident flight, the use of the main trimmers and/or the speed bar (foot operated accelerator system) would make the glider extremely unstable. The combination of a high flying speed and high wing loading would almost certainly make any collapse of the glider a dynamic departure from normal flight, leading to a high speed rotation and a correspondingly high rate of altitude loss.

Eyewitnesses describe how Pilot A appeared to be in a spiral descent when he crashed. A spiral descent is not uncommon after a glider collapse as the canopy often recovers asymmetrically and with considerable energy. This can involve high rates of descent with high 'G' force on the pilot and can be difficult and sometimes impossible for the pilot to control. The Hadron manual describes how "the Hadron XX is a very agile paraglider, so entering a spiral dive happens very quickly...". Recovery from a spiral dive takes time and altitude. With limited ground clearance and increasing 'G' force, the only option for the pilot may be to deploy his emergency parachute.

It is the view of the Investigation that the incident is most likely to have occurred when the pilot increased his speed, possibly by application of the main trimmers and speed bar. The absence of any further instrument data means it is impossible to say exactly what happened after the initial loss of control but it is evident from witness statements that the glider entered a fast spiral descent. Although the pilot deployed his emergency parachute there was insufficient height for the parachute to slow his descent to a survivable rate. The Investigation considers the configuration of the trimmers to have been a major factor in this incident.

SECTION 3 – CONCLUSIONS

The Investigation concluded that the incident occurred as a result of the pilot failing to follow the procedure for safe operation of the glider's trimmers in accordance with the manufacturer's user manual. This resulted in the pilot losing control of the glider at a height from which recovery was unlikely, particularly when the glider was being flown close to the maximum recommended weight, despite the fact the pilot managed to deploy his emergency parachute.

SECTION 4 - SAFETY RECOMMENDATIONS

The Investigation recommends that the BHPA, via its members' magazine Skywings, remind pilots of the necessity of becoming fully familiar with any unusual features of their aircraft, and also of the dangers of flying gliders with high wing loading

APPENDICES

Link to the Dudek Hadron XX user manual;

<http://www.dudek.eu/images/stories/pliki/skrzydla/hadron-xx/hadron-xx-manual.pdf>

NOTE!

Please read this manual carefully before your first flight

Very important!

Before use it is vital to check in which configuration the steering lines and pulleys are currently set (lower or upper hangpoints) and adjust them to your preferences if necessary.

The risers have three points to fix the pulleys on – lower, middle and upper one (see risers on page 11). On each main steering line there are points marked, to fix the steering handle corresponding to the middle position of the pulley. Position of the handles should be adjusted according to your pulley setting.

Steering lines must not push down the trailing edge when not operated – this must be observed in all possible configurations of trimmers and speed-system. Steering lines must have a couple of centimeters play before they engage affect the canopy (see section 3.1 on the proper adjustment). For sake of safety it is always recommended to

set the brakes rather too loose than too tight. Make sure they are set symmetrically, too.

System AFS (Aerodynamical Flaps System)



Ill-adjusted steering lines may cause you to misinterpret the canopy's behaviour in flight, and may cause dangerous collapses in accelerated flight when set too short.

AFS (Aerodynamical Flaps System) - by additional little trimmer you can partially modify the airfoil (like flaps in the aircraft). Before attempting actions like take off/landing in nil wind or thermal flying, the little trimmers should be pulled in, that is activated. At all other flight parts little trimmer should be opened (inactive).

The AFS trimmers are marked in two colours:

Yellow - system activated (launch, landing, thermalling) - forbidden release of the main trimmers and speed-system operation,

Green - system inactive (normal flight) - operation of the of the main trimmers and speed-system allowed.

Do not use neither speed system nor main trimmers with closed (activated) little AFS trimmers! This can cause violent collapses!

When flying at full speed (trimmers opened / trimmers opened and speedbar pushed), in rough air, it is highly recommended to steer the paraglider using alternative steering methods like TCL (Tip Control line) and connected TST toggle .

With increasing speed an effect of „inverting” the profile when trailing edge is being pulled down emerges. That effect can cause dynamic collapses, especially at full speed.

The safest way to change your course at high speeds is to use the TST and TCL lines, or (in the order of safety) the outer lines of the 2D steering system. Any steering inputs should be smooth and easy, without sharp and/or deep movements. Such actions can dynamically change pressure distribution over the airfoil, leading to collapses.

These warnings affect every paraglider and the Hadron XX is no exception!