ACCIDENT

Aircraft Type and Registration:	Schleicher ASW 24, G-CFNG	
No & Type of Engines:	None	
Year of Manufacture:	1988 (Serial no: 24015)	
Date & Time (UTC):	4 December 2016 at 1235 hrs	
Location:	Brentor Airfield, Devon	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - None
Injuries:	Crew - 1 (Fatal)	Passengers - N/A
Nature of Damage:	Destroyed	
Commander's Licence:	Sailplane Pilot's Licence (SPL) and Airline Transport Pilot's Licence	
Commander's Age:	47 years	
Commander's Gliding Experience:	1,500 glider hours 130 hours in the last 12 months (Approximate figures as it was not possible to access pilot's electronic logs)	
Information Source:	AAIB Field Investigation	

Synopsis

During a glider winch launch in turbulent conditions the weak link parted. The pilot attempted to fly a circuit to land near the launch point but the glider encountered significant sink and had insufficient energy to complete the intended circuit. The pilot sustained fatal injuries in the impact with the ground.

History of the flight

Background

The pilot, accompanied by other pilots from his regular gliding site, had taken his glider, G-CFNG, to the Dartmoor Gliding Society gliding site at Brentor Airfield. Two of the group had flown from this site before, three and five times respectively, but the accident pilot appears not to have done so. The group arrived at the site early in the morning, had a briefing from the local club duty instructor and walked the takeoff and landing area.

The group had self-briefed about the weather conditions which included strong winds from the east and 'rotor cloud' over the eastern end of the airfield; indicative of significant turbulence. This information was reinforced by the discussion with the Dartmoor Gliding Society duty instructor and during their walk of the airfield the visiting group noted the wind was "roaring" in the valley, to the east of the airfield, even during periods of reduced wind on the airfield itself.

The duty instructor had decided that, as the conditions were not suitable for the training gliders that the club owned, there would be no flying of club aircraft. However, this decision did not apply to privately owned gliders and the club facilities could still be used to launch them.

A Discus B glider, operated by a Dartmoor-based pilot, had been positioned as the first to launch. G-CFNG, a Schleicher ASW 24, was lined up as the second to launch, with a third glider arranged after it.

Witnesses later estimated that the wind was from the east in the region of 20 kt gusting to 30 kt and the visiting group watched as the Discus B was launched. From the perspective of the ground witnesses this launch seemed moderately steep but otherwise normal. However, the pilot of the Discus exceeded the maximum launch speed for his aircraft and so released the winch cable, reaching a peak airspeed of approximately 100 kt and a height of 420 ft. At this point he felt he had plenty of energy in the glider to complete a circuit and so immediately turned left to head downwind. The pilot of the Discus later reported that conditions were very turbulent and that he required three-quarters to full control deflections to maintain control of the glider. On the downwind leg the glider's airspeed was approximately 90 kt and, abeam the airfield windsock, the pilot of the Discus reported that he encountered "severe sink", with a rate of descent of around 29 fps[1] (the 'still air' sink rate for this aircraft is about 8 fps at 90 KIAS). The pilot cut the circuit short and due to the high sink rate did not use the airbrake during the turn to final approach. He used a much higher airspeed than normal for the approach and deployed the airbrake once below 100 ft aal. The pilot of the Discus flew over the launch point between 75 and 100 ft and landed further down the airfield than usual. He noted that the turbulence declined markedly below 30 ft aal. After landing, the pilot of the Discus decided that because of the severe conditions he would stow his aircraft for the day. After this flight the group decided to suspend launches.

The Discus pilot also provided some feedback to the winch driver, who commented that he had used about one-third throttle for the Discus when the maximum winch launch speed was exceeded and would therefore use less power for the next launch.

The accident flight

During the break, the group noticed the windsocks, mounted at either end of the site, were pointing in opposite directions. A little later the wind appeared to have dropped, with the windsock near the clubhouse hanging slack for a few minutes. The group walked the airfield again and, while at the winch end of the airfield, the winch crew suggested they make a decision about flying or cancelling for the day. It was now approximately one hour after the launch of the Discus and the conditions appeared much improved from the time of that launch, with the wind "reasonably steady" along the strip at about 20 kt. Following discussion the group decided to resume flying.

Footnote

[1] feet per second.

G-CFNG was positioned for launch with the same cable and weak link[2] as were used for the Discus launch and the pilot completed his pre-flight activities, which included turning on three cameras[3]. He was assisted in strapping in by another of the group and his preparation appeared normal. The cockpit camera did not capture the pilot's contingency briefing but the external cameras did record the control checks, which appeared normal.

The slack in the winch cable was taken up, the 'all-out' signal was given and the launch commenced. The glider accelerated rapidly becoming airborne in about four seconds and rotated smoothly into a climb attitude. The group watched and, as the glider was at approximately 200 to 300 ft, the weak link parted. They saw the glider pitch gently forward over the top of an arc before starting a left turn. As the left turn progressed, through approximately north, the turn tightened and the glider started to sink to the left and then entered a very rapid descending left turn before disappearing out of sight in an area of gorse bushes to the north of the airfield.

The group ran to provide assistance, arriving at the glider shortly after the accident. The pilot had sustained severe injuries and members of the group attempted CPR until paramedics arrived some 25 minutes after the accident. The paramedics confirmed a few minutes later that the pilot had died.

Pilot information

The pilot held an EASA Sailplane Pilot's Licence (SPL) and a valid EU Class 1 Medical. In addition he held the following British Gliding Association (BGA) certificate and badges:

- Bronze Certificate completed in August 2007 with a cross country endorsement
- Silver Badge completed in May 2008
- Gold Badge completed in June 2010
- Three Diamond Badges, third diamond completed in October 2011.

The pilot was an experienced sporting glider pilot with substantial hill and mountain soaring experience both in the UK and other countries. He had demonstrated two launch failures with a club instructor at the North Hill site in April 2016 during an annual check flight. The pilot was known for his propensity to seek challenging conditions in his chosen sport, glider flying. In addition to flying gliders, the pilot held an Airline Transport Pilot's Licence (ATPL) and had command experience on Boeing 747-200, -400 and -8 aircraft.

The pilot's logbooks were maintained electronically and it was not possible to access them.

Footnote

[2] This is acceptable and normal practice.
[3] Mounted on the tail, right wingtip and in the cockpit. Details in the recorded information section.

Airfield information

The Dartmoor Gliding Society's site, known as Brentor Airfield, is located on a ridge 2.5 nm north of Tavistock, in Devon, at an approximate elevation of 820 ft. The grass runway is orientated approximately 110°/290° and is approximately 1,100 m long. The airfield is unlicensed.

The terrain in the area is dominated by the high moor of Dartmoor starting about 3 nm to the east of the gliding site and extending for over 10 nm. The southern part of the moor rises to an elevation of 1,600 ft with the northern area being around 2,000 ft. A north-south valley between the main high moor and the ridge line descends to an elevation of 490 ft.

On the day of the accident the winch was located at the eastern end of the site. The ground beyond the winch point drops off steeply, making an overrun an unattractive proposition. However, to the south of the site there is a series of fields offering a reasonable prospect of an off-airfield landing. The surface immediately to the north of airfield is soft moorland and high gorse (Figure 1).

Aircraft information

G-CFNG was a Schleicher ASW 24, a single-seat Standard Class sailplane with a wingspan of 15 m, with similar performance to the Discus B which had flown earlier. The ASW 24 is constructed from a combination of carbon and glass-reinforced fibre. It has a retractable monowheel, airbrakes and removable winglets which were found fitted at the time of the accident.

The glider can carry water ballast but there was no evidence that the pilot was carrying any on this flight. The empty weight of the glider was 254 kg and the pilot's weight was 105 kg, giving a total weight of 359 kg. The maximum weight is 500 kg.

The flight manual quotes stall speeds of 35 KIAS at 320 kg and 39.5 KIAS at 410 kg. For approach, the flight manual states '*maintain about 51 kts'* and '*in turbulence, the approach speed should be appropriately increased'.* The BGA Instructors' Manual recommends approach speeds as follows:

> *With low risk of speed loss - 50 kt*
> *With small risk of speed loss – 55 kt*
> *With moderate risk of speed loss – 60 kt*

The Manual also indicates: '*higher speeds may be needed at hill sites or in extreme conditions'*.

Accident site

The aircraft wreckage was located 86 m north of the runway edge in an area of gorse-covered moorland (Figure 1). The impact marks and wreckage distribution were consistent with the aircraft having struck the ground in a 90° left bank with the nose down. The left wing had separated at the root and the cockpit area was destroyed.

Both ends of the 'blue' weak link were recovered. The fracture faces did not exhibit any corrosion or signs of metal fatigue. The weak link had necked in its centre indicating that the link had parted, consistent with its design, following a load application in excess of its yield strength.

Survivability and pathological information

Given the high speed, the extreme nose-down attitude at impact and the limited energy absorption of the front cockpit structure, the accident was not considered survivable. A subsequent post-mortem examination of the pilot identified that death resulted from multiple injuries consistent with the ground impact and there was no evidence of any pre-existing medical factor which would have contributed to the accident. The toxicological results were negative for drugs and alcohol.

Aircraft examination

The aircraft wreckage was recovered to Farnborough for detailed examination. There were no disconnections in the flight controls apart from overload failures associated with impact. No defects were found that would have contributed to or caused the accident.

Recorded information

Sources of information

The pilot had mounted three 'action' video cameras to his glider; one on the tail, one on the right wingtip and one internally in the cockpit that afforded a good view of the cockpit instrumentation and of the external view ahead and to the sides of the glider. All of these cameras were recovered from the accident site, downloaded and found to contain footage of the flight. In addition, the investigation also had access to two further video recordings of the flight, filmed from the ground on mobile phones.

The glider was fitted with a Naviter Oudie, a gliding computer which logged flight data to non-volatile memory and this was connected to a LXNAV V7 variometer[4]. The variometer computed true airspeed, groundspeed, ground track and performance metrics for the flight using the aircraft's pitot-static system[5] and GPS information. This data was in part recorded by the Oudie but, shortly after the apex of the climb, the recording of the flight stopped for unknown reasons. Figure 1 shows the vertical profile, ground track and true airspeed data recovered for the accident flight from the Oudie.

The Discus B glider was also equipped with a LXNAV FLARM[6] device which was downloaded and it was this analysed GPS data that indicated the rate of descent of approximately 29 fps which developed during the Discus pilot's turn from base leg onto finals.

Footnote

[4] A variometer is an instrument that indicates the vertical speed of a glider, usually incorporating an audio output.

[5] The pitot-static system used by the variometer was the same system used for the airspeed indicator, which is discussed below in the *Review of the cockpit video* section

[6] FLARM is a traffic awareness and collision avoidance technology for General Aviation, light aircraft, and UAVs.

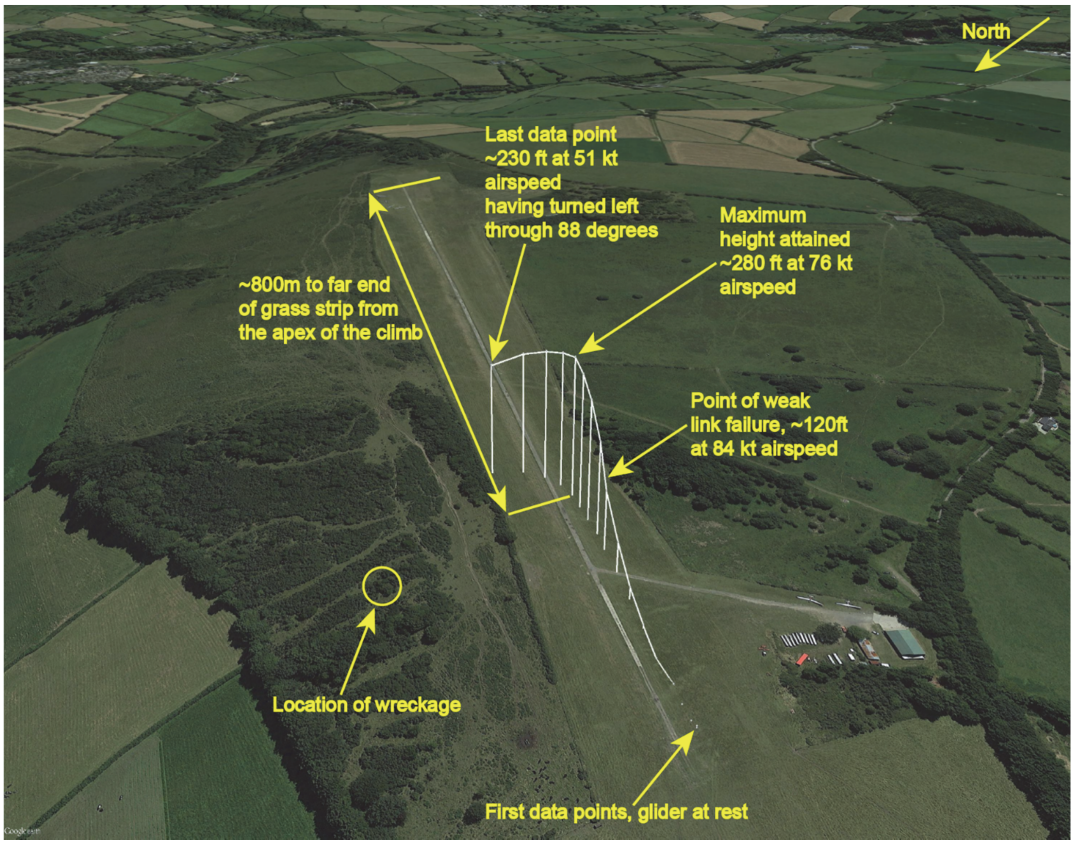


Figure 1

Vertical profile (ft aal[7]), ground track and true airspeed data for the accident flight

Review of the cockpit video

The airspeeds referred to in this section are approximate as they are derived from the images of the airspeed indicator on the video, therefore the interpretation is by visual determination and has not been corrected for instrument or position error. The altitudes were similarly derived from the altimeter in the recorded video and are not identical to those in the data recovered from the Oudie.

The windsock, when visible before and during the launch, varied from full to approximately ⅓ full and in direction from roughly aligned with the launch direction to 30° of crosswind from the left.

The initial launch appeared normal with the glider becoming airborne at about 53 KIAS, five seconds after the launch started. Three seconds after the glider became airborne it was at 78 KIAS, and about 100 ft aal, when the weak link parted (Figure 2). The pilot immediately looked left and looked left repeatedly from this point on. At no time did the pilot look to the right.

Footnote

[7] In this report, aal (above airfield level) is used to reference heights above the glider launch point on the day.

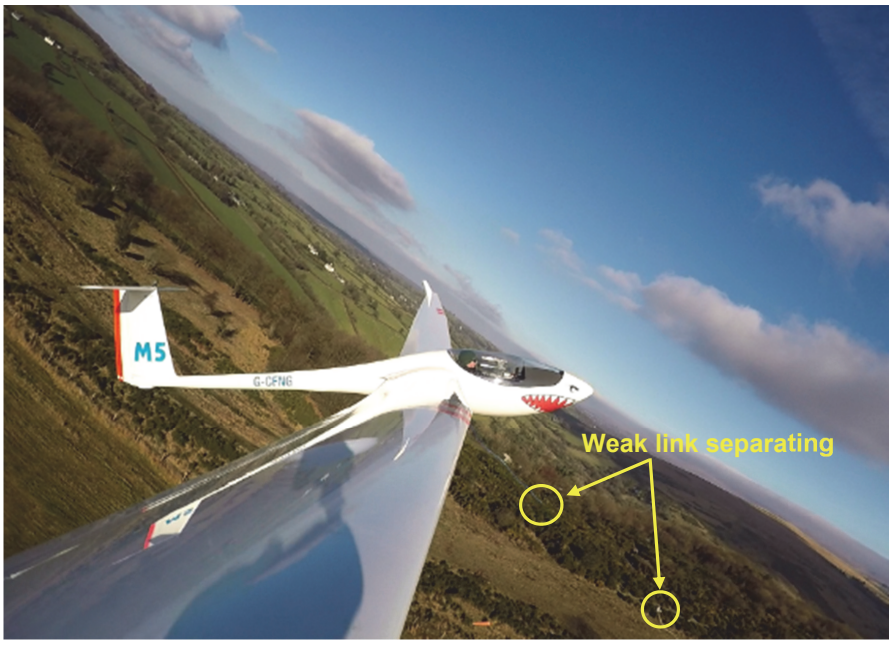


Figure 2

Glider at the moment of launch failure

Over the next four seconds the glider pitched gently nose down, gaining height while slowing to 60 KIAS[8]. This pitch-down manoeuvre brought the nose of the glider to approximately level with the horizon. The pilot then made an approximately half-to-two-thirds left roll input on the control stick, while sustaining a neutral to slightly forward pitch input. The glider rolled left, the nose dropped below the horizon and began to turn to the north during which the speed reduced to 51 KIAS (Figure 3).

Figure 3

Cockpit view as left roll input is being made

Footnote

[8] The figures in this section differ from the data extracted from the Oudie and the differences are not readily resolved.

Nine seconds after the launch failure, the glider was in an increasing 40° left roll with the nose slightly below the horizon and had turned 20° to the north, away from the launch heading and the speed had stabilised at 51 KIAS. The yaw string was neutral, showing a co-ordinated turn, and the pilot was commanding a further left roll with left stick resulting in the roll increasing to 60° over the next second.

Eleven seconds after the launch failure, the glider was in a sustained 60° left turn at 51 KIAS (Figure 4) and had turned through approximately 90° from the launch heading. The nose of the glider then dropped well below the horizon and the airspeed and the descent rate increased, with the glider rolling rapidly left through 80°, with the airspeed reaching 70 KIAS before it hit the ground 14 seconds after the launch failure.

Figure 4

11 seconds after launch failure, with significant left aileron input

Meteorology

Weather information was available from the group of glider pilots, the crews of the Police and Air Ambulance helicopters, the various video sources and FLARM downloads, a roadside wind sensor and an aftercast provided by the UK Met Office.

Helicopter crews

The helicopter crews were highly experienced in operating in the area around the accident site and particularly the low valley to the east of the site, which was a regular poor weather route between the north and south of Devon. They reported that around the time of the accident there was significant turbulence both across the high area of Dartmoor and in the low valley area immediately to the east of the glider site. One helicopter commander described it as the worst turbulence he had experienced in seven years of operating regularly in the area of that valley. There was up to 40 kt of wind from the east at 400 ft over the accident site.

Roadside sensor

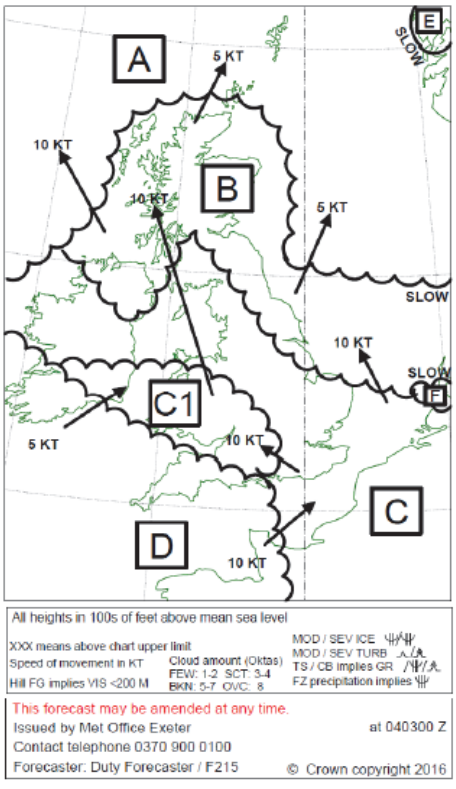
The surface wind at the accident site was not recorded but a roadside weather station on the A386 road at Shortacombe village (4.6 nm north-east of the accident site) recorded a steady wind speed of 27 kt, with gusts to 35 kt, around the time of the accident.

Met Office

The UK Met Office provided an aftercast of the conditions across the south-west of England:

> *'The Exeter observations, to the east of Dartmoor, show east to north-easterly winds, relatively steady between 05 and 10 kt, generally good visibility, no significant weather and few or scattered amounts of cloud, with bases around 2000-2500FT. Pressure was relatively high for the time of year, at around 1020hPa.*
>
> *Meanwhile, the Newquay observations, to the west of Dartmoor, show brisk south-easterly winds. Although the direction remained steady between 100-120 degrees, the speeds were more variable, ranging between 20 and 27KT during the middle of the day, before easing from the 1350 UTC observation onwards. Furthermore a gust of 29KT was reported at 1320 UTC. Otherwise, visibility was generally good, with no significant weather and few amounts of cloud, with bases between 1800 and 3500FT. Pressure was relatively steady at around 1016 or 1017 hPA.'*

The forecast Metform 215 for the time of the accident (Figure 5) highlights at Area D the risk of mountain waves (MTW) and occasional moderate low-level turbulence near the accident site. In particular, it noted that mountain waves of 500 feet per minute were expected at around 4,000 ft.



Forecast Weather below 10000 FT

Met Office Valid 040800 to 041700 Z DEC 16 Fronts/zones valid at 041200 Z

AREA	SURFACE VIS AND WX	CLOUD	0 C
A	25 KM NIL ISOL 7 KM SHRA/RA ISOL 3000 M DZ/BR LCA 1500 M -SN MON NORWAY ISOL (OCNL NORWAY) HILL FG	BKN/OVC (LCA SCT LEE MON) CU SC ... ... ⅄ 015-030 / 050-070 ISOL (OCNL UPSLOPES) SCT/BKN ST ... ... 008-012 / 015	030-040 NE 070 SW ... ... BUT ... ... SUB- ... ... ZERO 030-050
B	30 KM NIL ISOL 3000 M BR LAN MAINLY SE ... ... SCOTLAND ISOL 200 M FG/FZFG LAN MAINLY ... ... SE SCOTLAND ISOL HILL FG	AREAS SCT/BKN CU SC ⅄ ... ... 015-025 / 040-050 ISOL SCT/BKN ST 004-010 / 015 LAN ... ... MAINLY SE SCOTLAND ... ... (BASE 000 FG/FZFG)	020-040 NE 070 SW ... ... LCA ... ... SUB- ... ... ZERO 025-050
C	25 KM NIL ISOL 3000 M BR MAINLY CONTINENT ISOL 200 M FG/FZFG LAN TL 11 Z MTW MAX VSP 500 FPM AT 040 C1 OCNL ⅄ C1 ISOL HILL FG	ISOL SCT/BKN CU SC ⅄ ... ... 015-020 / 020-030 ISOL SCT/BKN ST 004-010 / 015 ... ... MAINLY CONTINENT ... ... (BASE 000 FG/FZFG)	070-090
D	20 KM NIL ISOL 6 KM -DZ MTW MAX VSP 500 FPM AT 040 LAN NE OCNL ⅄ LAN NE ISOL HILL FG	OCNL BKN CU SC ⅄ 015-020 / 020-030 ISOL SCT/BKN ST 007-012 / 015	080
E	15 KM NIL OCNL 6 KM RA ISOL 3000 M RADZ LCA 800 M SN MON ... OCNL HILL FG	BKN/OVC AC ⅄ 080 / XXX BKN/OVC CU SC ⅄ ... ... 015-025 / 060-080 OCNL BKN ST 005-010 / 015	040-050
F	15 KM NIL WDSPR 3000 M BR LAN WDSPR (OCNL FM 11 Z) 200 M FZFG LAN WDSPR HILL FG	WDSPR BKN ST 002-006 /010-025 ... ... (BASE 000 FZFG)	060

Outlook Until 042359 Z:ISOL FG/FZFG PATCHES FORMING INLAND IN ZONE C DURING THE EVENING.

Figure 5

Forecast low-level weather, 4 December 2016

Satellite imagery of the area at the time of the incident confirms the presence of mountain wave activity in the Dartmoor area and therefore a high probability of significant turbulence at low levels (Figure 6).

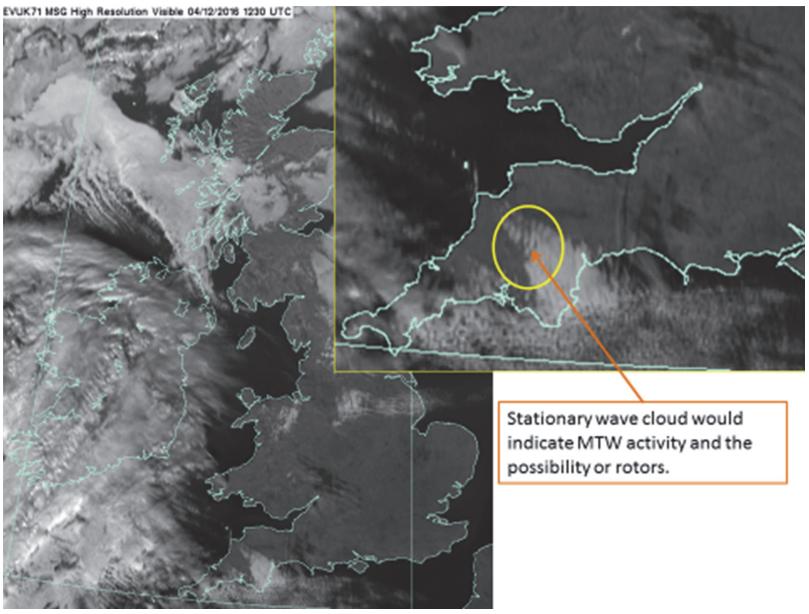


Figure 6

Satellite image

'Mountain wave' activity from high ground

In areas of mountain wave activity a low-level turbulent zone can extend many kilometres downwind from the high ground inducing the phenomena. Brentor Airfield would have been within this zone on the day of the accident (Figure 7).

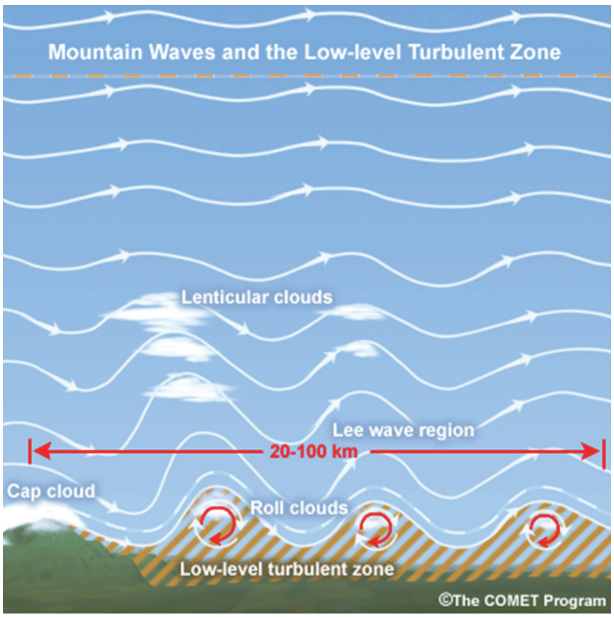


Figure 7

'Mountain Wave' diagram

Aircraft performance

As well as the meteorological conditions around the time of the accident, the investigation examined the glider's performance following the launch failure and whether it would have been possible to land straight ahead.

During an ASW 24 flight test in 1993, a maximum glide ratio of 44 to 1 was measured at 49 kt and a minimum sink rate of 108 ft/min (1.8 fps) was measured at 45 kt. No published landing distance figures were available but the AAIB had access to data logger information for an approach flown in an ASW 24. The airbrakes were half extended, the wheel was down and the airspeed was 70-75 KIAS. The data showed that a glide ratio of 8.9 was achieved (still air) with a ground roll of 154 m, although this could have been less with more aggressive braking. The pilot, whose data logger was used, estimated that a ground roll of 120 m would have been easily achievable.

The aircraft manufacturer provided airspeed and vertical speed data with full airbrake extension. At 54 KIAS the glide ratio was 6.9 and at 57 KIAS the glide ratio was 5.9. At higher speeds the glide ratio would have been lower but this data was not available.

Landing performance calculation

G-CFNG achieved a maximum height of about 280 ft after the weak link failure. If a landing had been initiated at this point, using half airbrake, the glide distance would have been about 760 m (using a glide ratio of 8.9) in still air. With a headwind of 20 kt this distance is reduced to 540 m. With a ground roll of 120 m, this would have resulted in a landing distance of 660 m. With full airbrake extended, using a glide ratio of 5.9 and a 20 kt headwind, the landing distance would have been 478 m. Figure 1 indicates that, at the apex of the glider's climb, the length of runway ahead was approximately 800 m.

Glider winch launching

Background

Winch launching involves using a cable to pull a glider towards the winch, accelerating it to flying speed and then, as the glider reaches an appropriate speed, the pilot rotates the glider into a climb. The climb continues until the maximum height available, or desired, from the launch has been achieved and the pilot releases the cable, which falls back to earth under a parachute, while the glider flight continues.

The height the glider will reach during the launch is determined by various factors but primarily by the length of the winch cable. The acceleration during launch is rapid and the glider is typically airborne within two or three aircraft lengths.

The cable is connected to the belly-hook of the glider via a weak link. This link is designed to protect the glider by parting in the event of too high a load being applied to it during the launch. Alternatively, if the pilot notices the glider is above its winch limit speed, he or she can release the cable early. Weak link separations are not uncommon, particularly in turbulent conditions.

Launch failures

Winch launch failures occur for a variety of reasons, ranging from mechanical failure of the winch to mishandling of the winch or aircraft. Regardless of the initiating event it results in the glider pilot having to manage the resultant situation to recover to a safe landing.

The failure handling can be broken down into phases depending on when it occurs. In the event of a failure during the initial stages of a winch launch the glider should be able to land ahead, on the gliding site (Figure 8). After a short period the glider will reach a height from which it is possible to return to the launch site via some form of abbreviated circuit. The glider site and conditions should be such that one option is always possible and to ensure this happens there will also be a period during which both options will be possible. This overlap is normally in the order of 200 to 300 ft deep and as the headwind or field length increases the depth of this overlap will also increase.

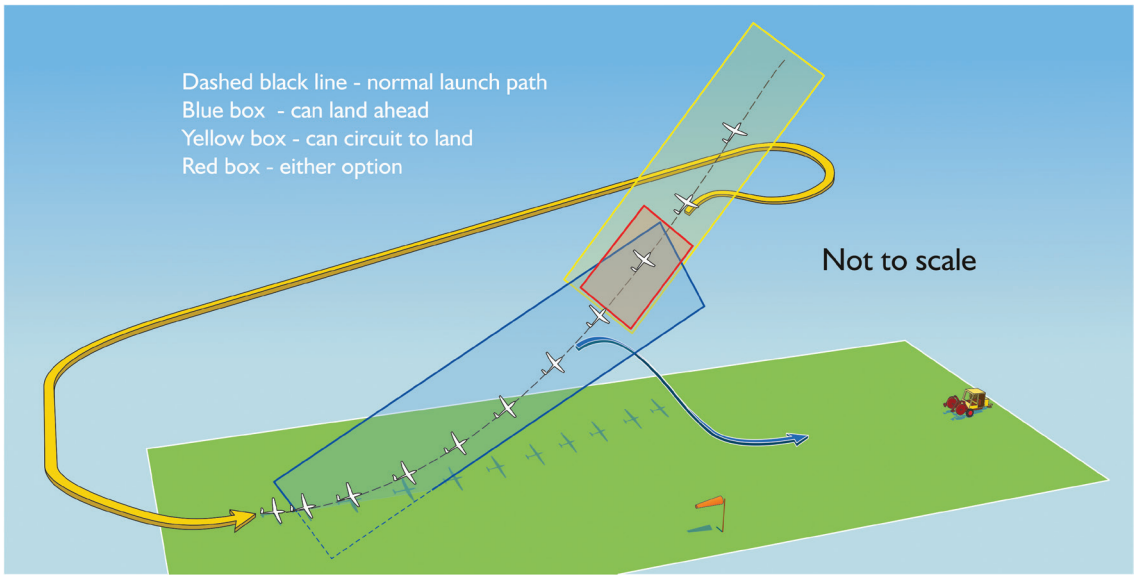


Figure 8
Launch options picture

In the event of a cable break, or weak link separating, the BGA recommended action is to immediately lower the nose to the recovery attitude. This is more nose-down than the normal approach attitude and is intended to achieve two separate but important objectives.

The steep nose-down attitude allows the glider to recover airspeed to a safe speed more rapidly than in the normal approach attitude. The second objective is to give the pilot a clear view of the remaining strip ahead to allow an effective decision on whether there is sufficient strip remaining to land ahead. This will depend on the height of the failure, the size of the field, the wind component and gradient and the glider type. If a turn is to be made BGA teaching recommends an initial turn away from the wind.

Safe winch launching initiative

In 2005 the BGA began a campaign to improve safety in the winch launching of gliders. This has developed further over the years and the BGA '*Safe Winch Launching*' leaflet published in 2015 included the following information:

> *'A winch launch accident is defined as an accident resulting from a winch launch which… does not proceed to the usual height…This can be for any reason including winch fault, cable break, cable snarl up and cable release by the pilot.*
>
> *BGA records show that there were 36 fatal and 72 serious injuries from accidents associated with incomplete winch launches between 1974 and 2005. 278 gliders, about 8 per year, were destroyed or substantially damaged in winch accidents in the same period.*
>
> *The main sources of fatal injury were a stall during rotation and a spin after power loss in mid launch. The main sources of serious injuries were these two groups and also a stall after power loss below 100ft.*
>
> *The BGA safe winch launch initiative began in October 2005, 9 years ago. In those 9 years there have been 5 fatal or serious injury winch accidents compared with the previous 9-year average of 27. Fatal or serious injury stall/spin accidents declined from a 9-year average of 22 to 2.'*

Current information on this initiative is available on the safety pages of the BGA website, https://members.gliding.co.uk/bga-safety-management/safe-winching, which includes a current and downloadable version of the BGA leaflet, with practical safety guidance on all phases of a glider winch launch. This 2015 edition of the leaflet three '*critical elements for staying safe',* of which one is:

> *'After power loss in mid-launch, adopt the recovery attitude, wait until the glider regains a safe approach speed, and land ahead if it is safe to do so.'*

AAIB experience

An AAIB Inspector undertook a cable break exercise with a BGA Instructor to gain an understanding of the flight dynamics of a winch launch failure. During this sortie the instructor emphasised that at low heights the preferred choice should always be to land ahead.

Following a cable break the training focusses on the importance of adopting the "Recovery Attitude", both to guarantee sufficient airspeed and to open the view of the landing area, prior to making a decision to turn.

Analysis

Factors in the accident

The winch cable weak link parted due to a load application that was in excess of its yield strength. Weak link separations in turbulent conditions are not uncommon and it is highly likely that the weak link parted due to the turbulent conditions.

The weak link parted at around 120 ft aal, though with a comparatively high speed at the separation point and with the additional energy the aircraft climbed to a peak of approximately 280 ft aal. At this point the pilot promptly began a turn to the left. Very soon after starting the left turn it appears that the aircraft was affected by a significant downdraft and probably a significant decay in airspeed due to wind shear. As a result the aircraft did not gain airspeed for several seconds despite a pronounced nose-down attitude. This increased the rate of descent to a very high value and at this point the situation was beyond recovery.

From the glider performance calculations, up to the point where the pilot turned to the left, there would have been sufficient strip remaining for a landing ahead to be safely executed, even with half airbrake. However, given the achieved height, the performance of the aircraft and the pilot's experience it is clear he believed that an abbreviated circuit to return to the launch point was viable.

It is not possible to determine which factors contributed to the pilot's decision to turn. One way his decision making may have been influenced was by the fact that a landing ahead would have stopped further launches and also resulted in a lengthy retrieval exercise. Two other possible factors may have been that, at an unfamiliar airfield, he was concerned about the unforgiving terrain beyond the winch end of the strip, if he over-ran, and that a locally-based Discus glider had managed an abbreviated circuit earlier that day, in what appeared to have been worse conditions.

As it was, the pilot in G-CFNG did not fully adopt the aircraft recovery attitude recommended by the BGA, probably because his airspeed was already close to a normal approach speed. However, part of the philosophy of this recovery attitude is to offer the pilot a clear view of a prospective area in which to land ahead. In this case the aircraft still had sufficient speed to manoeuvre, though the higher-than-recommended pitch attitude would have constrained the pilot's view of the remaining length of airfield. He may therefore have had a false impression of the landing area ahead and this may have contributed to his decision to make an immediate turn.

The pilot chose to make a turn left toward the downwind leg of the circuit and this meant that his initial turn was upwind and therefore contrary to general BGA teaching. BGA teaching is to make an initial turn away from the wind, this allows the aircraft to be into wind after a smaller amount of turn should a crossfield landing be possible and also gives a reduced groundspeed during the base leg portion of the circuit. However, in this case the merits of turning right, away from the wind, would have been more limited than in the general case.

Context for the decision to fly

Following the accident, two members of the pilot's group, supported by two other experienced glider pilots who knew the accident pilot well, discussed with the AAIB some of the context on which they had based their decision to fly.

Favouring their decision to fly on that day was the generally sunny weather and that there was likely to be "epic wave". The flying conditions near the ground were likely to be "sporting" and "challenging" but the group had flown in such conditions previously and had always coped with them. The group had been gliding in similar conditions the previous month in Wales and they had all been gliding in windier conditions elsewhere.

The subtle messages against gliding were that the weather was somewhat unpredictable and that there was a significant probability of low-level turbulence over the launch site; this was reinforced by the flight of the Discus B.

The pilot in this accident was experienced, was current and was known for his interest in seeking out challenging flight conditions. He and his group had travelled to the site precisely because of the conditions as they believed this would offer them the opportunity for high performance gliding. The pilot had flown in very demanding conditions previously. At this level, gliding is a high performance sporting activity and the pilot knew of and accepted the degree of hazard to achieve high performance flight. Given the experience of the pilot, the decision to launch appears a reasonable choice.

Conclusion

When the winch launch failed there was sufficient distance available to land directly ahead and turning away from the landing area committed the pilot to attempting a circuit in unpredictable conditions. Assessment of the data from the Discus B shows that there were regions of significant sinking air. While it is difficult to be certain of the exact conditions for the accident flight, the general meteorological situation remained and therefore it is highly probable that there would have been significant areas of turbulent and downdraughting air in the area at the time of the accident. Sinking air of a similar magnitude to the conditions encountered by the Discus B would have removed any chance of completing a circuit from the height achieved by the accident aircraft. Regardless of the pilot's significant experience the area of sinking air meant that the glider did not have the performance to complete the circuit safely.

The BGA's winch launch safety campaign has significantly reduced the accident and fatality rate from the typical forms of launch failure. While this accident was somewhat unusual, given the highly turbulent conditions, the overall guidance in the Safe Launch Initiative remains relevant.

Safety actions

Safety action taken

Following this accident the BGA has issued additional guidance related to launch failures and the hazard associated with sink during the circuit.

In February 2017 the BGA published a leaflet *'Safe Winch Launching – Land ahead if safe to do so'* and this material was put on the BGA Website[9]. It contained the following text:

> *'The instructors' manual and the safe winch launch leaflet/booklet teach:*
>
> *After power loss in mid-launch, adopt the recovery attitude, wait until the glider regains a safe approach speed, and land ahead if it is safe to do so.*
>
> *Why not turn? The BGA has been teaching 'do not turn' because:*
>
> *after a push-over the airspeed can be less than the attitude would suggest*
>
> *turning before the glider has accelerated to a safe speed after a launch failure can cause the glider to spin.*
>
> *After commencing a turn, although the glider may have sufficient airspeed to avoid a stall and spin, no landing area may be immediately available, and this can expose the glider to other hazards which can prevent a safe landing. Sink is one such hazard, often associated with strong winds and wave. A glider making a 360° turn in still air at a bank angle of 35° and 50kt typically descends by only 70ft. But with 15ft/second sink the height loss in a 360° turn is over 400ft. If the launch failure was at 300ft the glider would crash before completing a 360° turn.*
>
> *The existence of additional hazards from a turn adds force to the advice:*
>
> *LAND AHEAD IF IT IS SAFE TO DO SO.*
>
> *If you are very experienced, you may sometimes be winch launching in challenging conditions. If you have a launch failure we would urge you to land ahead if it is safe to do so..'*

In October 2017 the BGA updated and published the leaflet titled '*Safe Winch Launching'*, in its 6th edition.

Footnote

[9] https://members.gliding.co.uk/library/safety-briefings/land-ahead-safe