Air Accidents Investigation Branch

AAIB Bulletin 5/2026

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(ALL TIMES IN THIS BULLETIN ARE UTC)

AAIB Field Investigation Reports

A Field Investigation is an independent investigation in which AAIB investigators collect, record and analyse evidence.

The process may include, attending the scene of the accident or serious incident; interviewing witnesses; reviewing documents, procedures and practices; examining aircraft wreckage or components; and analysing recorded data.

The investigation, which can take a number of months to complete, will conclude with a published report.

Accident

Aircraft Type and Registration:	Cessna FRA150L, G-PPFS
No & Type of Engines:	1 Continental Motors Corp O-240-A piston engine
Year of Manufacture:	1972 (Serial no: 0126)
Date & Time (UTC):	28 July 2024 at 0845 hrs
Location:	Near Thorganby, North Yorkshire
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - 1
Injuries:	Crew - 1 (Fatal) Passengers - 1 (Fatal)
Nature of Damage:	Aircraft destroyed
Commander's Licence:	Private Pilot's Licence
Commander's Age:	21 years
Commander's Flying Experience:	153 hours (of which 131 were on type) Last 90 days - 53 hours Last 28 days - 13 hours
Information Source:	AAIB Field Investigation

Synopsis

The aircraft entered a fully developed spin to the left but, when recovery actions were commenced, the control column was not pushed far enough forward to un-stall the wing. The aircraft therefore remained in a spin until it struck the ground.

The pilot was newly rated for aerobatic flying, and it was likely that the spin recovery technique had not yet become a skill-based response that he could apply effectively even when surprised.

The accident highlighted how unexpectedly challenging it can be to recover from multiple-turn spins.

History of the flight

The aircraft departed from Breighton Airfield (Breighton) at around 0815 hrs in fine weather. The pilot, who had a friend on board, flew northbound and informed Humberside radar control of his intent to perform aerobatic manoeuvres between 3,000 and 6,000 ft[1] amsl (Figure 1).

Footnote

[1] Breighton's elevation is 20 ft.

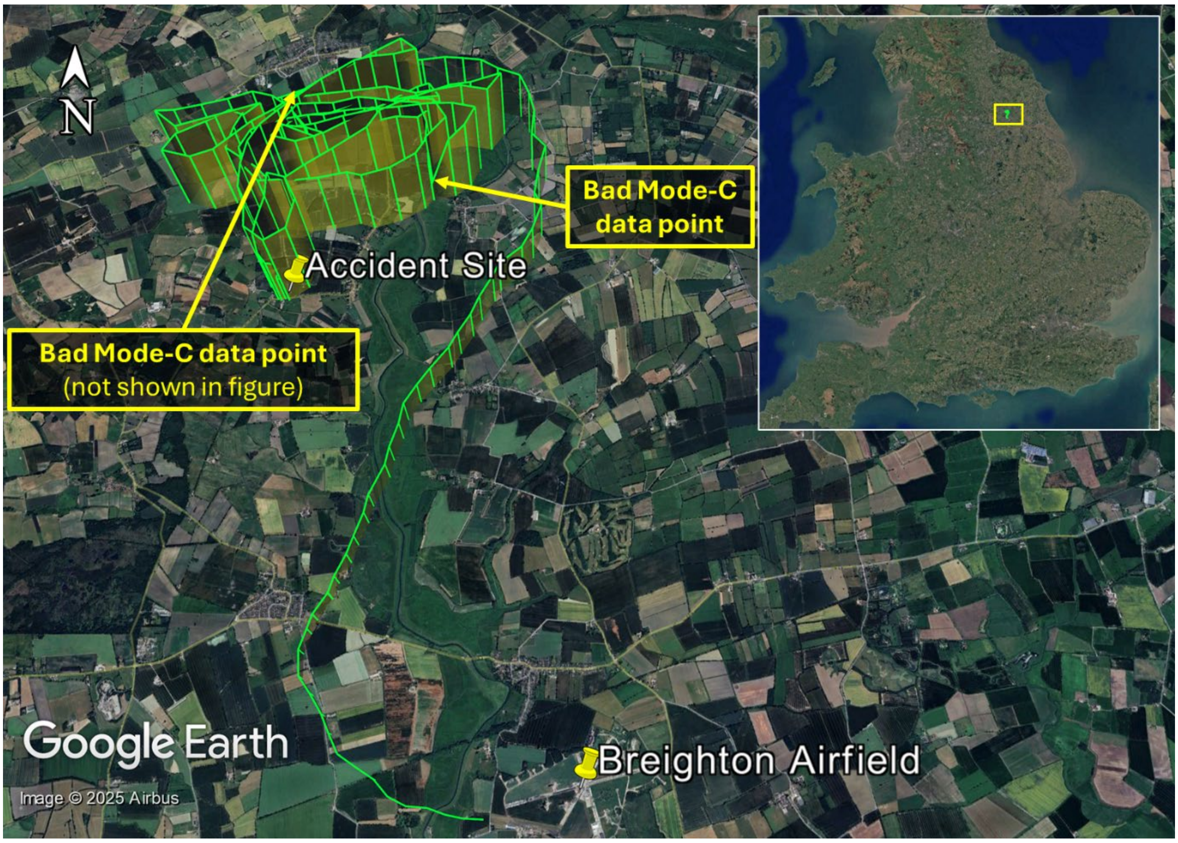

Figure 1

Aircraft's flight path from Claxby radar data

Video recordings from inside the cockpit showed the pilot performing aerobatic manoeuvres[2] from over 5,000 ft amsl. He performed lookout turns and regained altitude between each manoeuvre.

At 0844 hrs, the pilot entered the aircraft into a power off stall then a spin to the left[3]. While descending below 1,300 ft amsl (Figure 2), according to radar data, he transmitted a MAYDAY call saying the aircraft was "IN AN UNCONTROLLED SPIN". The ATCO replied but there were no further transmissions from the aircraft. The aircraft's average descent rate was about 5,700 ft/min. It disappeared from radar when it was below 600 ft amsl and struck the ground in a field near Thorganby at 0845 hrs. The ATCO alerted the emergency services.

Footnote

[2] None of those resulted in the aircraft spinning.
[3] See later section: Spinning – general information.

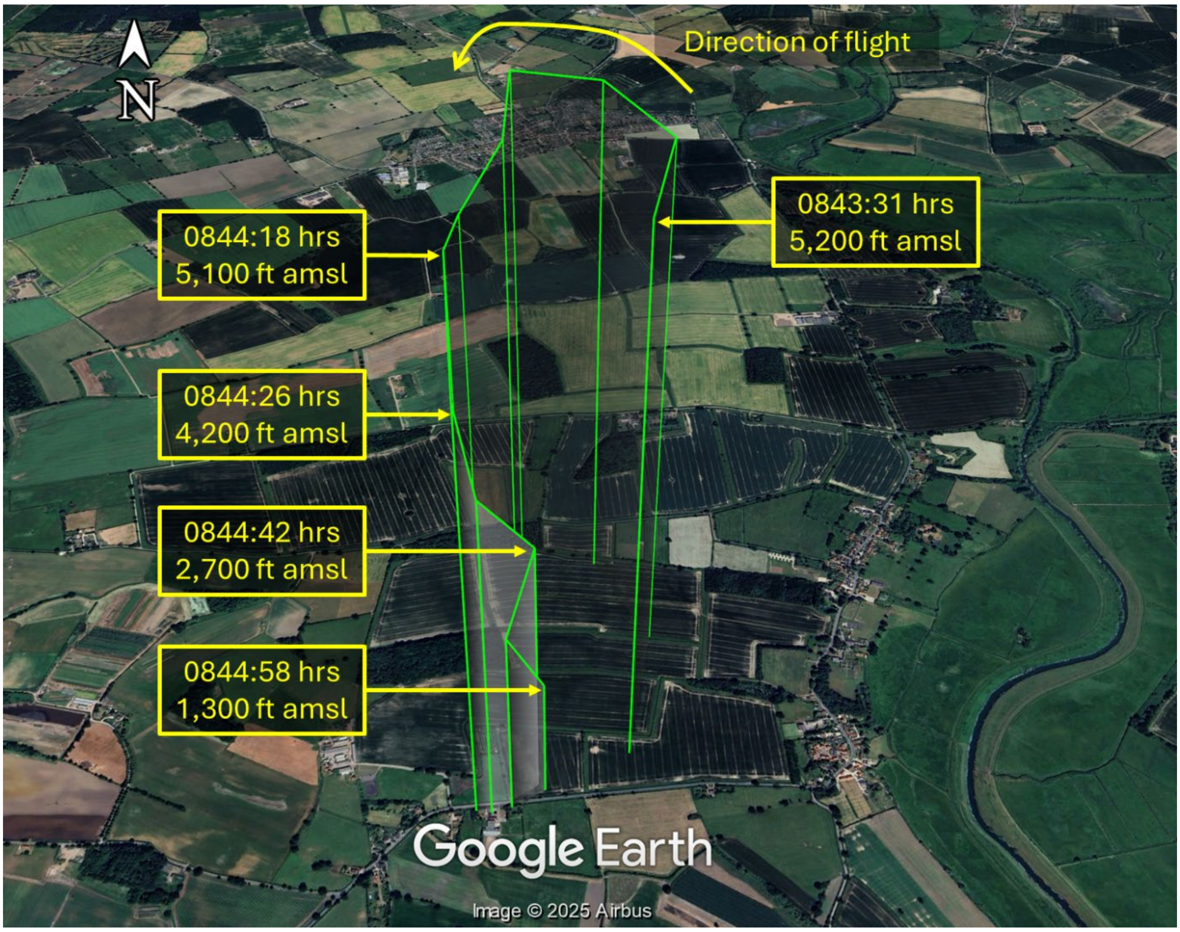

Figure 2

Aircraft's flight path during the descent

Recorded information

Introduction

An action camera and mobile phone were recovered from the accident site and downloaded by the AAIB. They contained video recordings made in the cockpit on the accident flight, including during the accident sequence.

ATC radar and R/T recordings from the day of the accident were obtained from NATS and Humberside Airport, as well as from the day before, covering the times when G-PPFS flew.

Cockpit video recordings

The video recordings gave a good view of the pilot's actions and captured several aerobatic manoeuvres performed during the flight, including the spin[4]. In some of the recordings, the pilot made a series of hand gestures before entering a manoeuvre, which appeared to indicate the manoeuvre he was intending to perform.

Foonote

[4] Relevant aspects are included in the 'History of the flight' and 'Spin manoeuvre and descent' sections of this report.

The action camera's video quality was sufficient to infer approximate airspeed readings from the ASI. The Altimeter and Vertical Speed Indicator (VSI) could also be read. Videos from the passenger's phone were of a higher resolution, enabling the altimeter setting to be read: It showed a QNH setting of 1025 hPa, as provided by the Humberside radar controller.

The video captured the pilot making an emergency RTF call to Humberside ATC as the altitude indicator read 900 ft QNH, and the VSI showed negative full-scale deflection (-2,000 ft/min). Timestamp metadata from the video recording indicated that G-PPFS struck the ground at 0845:13 hrs. The video recording showed that the engine was running throughout the flight, and that the pilots were not wearing parachutes.

Radar control position recordings

ATC recordings captured all radio communications between the pilot and the Humberside Radar controller, synchronised with recordings of the controller's radar display.

Mode-C altitude information was presented to the controller next to the aircraft's radar return and updated once every eight seconds. Displayed Mode-C reports were consistent with those from the Claxby Radar recordings. At 0845:05 hrs, the pilot made a MAYDAY call at a point where the ATC display indicated a Mode-C altitude of 1,300 ft amsl.

NATS radar data

G-PPFS was detected by the Claxby and Great Dun Fell radars for almost the whole accident flight, including Mode-C pressure altitude information at ±100 ft resolution. The flight path derived from the Claxby radar recordings is shown in Figure 1, with invalid data points removed based on comparison with other sources. The final portion of the flight is shown in Figure 2 with altitude corrected for local QNH.

Recordings of the Mode-C returns by Claxby radar indicated that G-PPFS began its final descent from about 5,100 ft amsl. The last detection was 40 seconds later, with a reported altitude of 1,300 ft amsl, corresponding to an average descent rate of about 5,700 ft/min. Based on this data, G-PPFS was estimated to have struck the ground at 0845:12 hrs, consistent with time-stamp metadata from the action camera video (which was 0845:13 hrs).

The spin manoeuvre and descent

The initial manoeuvre

Radar data showed the aircraft at around 5,100 ft amsl, (while the altimeter in the cockpit video showed 5,300 ft amsl), when the pilot reduced engine power to idle, allowed the airspeed to decrease, and entered a spin to the left at approximately 40 kt IAS. During the first turn, the IAS increased briefly to approximately 60 kt before dropping to less than 35 kt, the lowest airspeed marking on the airspeed indicator. Both occupants could be heard on the video counting to three – apparently referencing the number of spin rotations – before the pilot attempted to recover from the manoeuvre.

The rest of the descent

The video showed that the aircraft remained in a spin throughout the descent. The throttle remained at the idle position, and the aileron control stayed around the neutral position.

The pilot verbally indicated he was applying right rudder a number of times. Occasional views of the rudder pedals and sounds on the videos confirmed right rudder was applied. At times he appeared to momentarily relax his foot pressure on the pedal, then re-apply it, and there was a level of surprise[5] in his voice.

As part of the recovery actions, the elevator control was moved forward from the fully aft position it had been in as the spin was entered. Shortly afterwards, the control was moved aft by approximately half the distance it had previously moved forward. As the pilot transmitted his MAYDAY call, the control moved further aft to a position close to its position at spin entry. The IAS remained below 35 kt throughout the descent.

Accident site

The aircraft came to rest upright in a field having struck the ground in a nose-down attitude with a high rate of descent. The engine and wings remained attached, but the upper section of the rear fuselage had broken aft of the cockpit section. This was a consequence of the accident, and there was no evidence of an in-flight structural failure. The left aileron had been bent down at a 90° angle by the individuals who first attended the scene; this was to stabilise the aircraft to aid their attempts to rescue the pilot and passenger. The flaps were in the retracted position, and distortion along the longitudinal axis of the wreckage indicated that the aircraft was probably rotating to the left at impact. The propeller was still attached and one of its blades had cut into the ground indicating that the engine was running when the aircraft struck the ground.

Examination of the flying controls that were immediately accessible at the accident site showed no evidence of a pre-existing anomaly. The aircraft was recovered to the AAIB for further examination.

Aircraft examination

Examination of the aircraft at the AAIB confirmed that it suffered extensive damage in the accident, but examination of the structure and flying controls revealed no pre-existing failures that would have prevented normal operation.

Aircraft information

The Cessna 150 is a two-seat, high-wing monoplane with fixed tricycle landing gear. G-PPFS was a FRA150L Aerobat, manufactured by Reims in France and based on the Cessna 150 but with a more powerful engine.

The Airworthiness Review Certificate (ARC) was valid until 5 February 2025, and the aircraft had accrued approximately 6,500 flying hours.

Footnote

[5] A cognitive-emotional response caused by a mismatch between a person's mental model and reality.

The pilot's training and experience

The pilot's logbook

The pilot started flying in January 2021, following a modular training route[6] for gaining a CPL with IR. He flew frequently, mainly from a school at Breighton in Cessna 150 aircraft, including G-PPFS.

The pilot's logbook indicated that after initially undertaking a Light Aircraft Pilot's Licence (LAPL) course, he completed his PPL course in October 2022. He was working towards his CPL and had completed his ATPL ground school exams.

During the period from April 2024 until the accident, the pilot flew frequently – mainly as PIC for navigation and handling practice. One flight on 10 May 2024 was logged as *'Aerobatics practice'.* He completed an IR (Restricted)[7] between 24 May and 3 July 2024 in a DA40 aircraft at a different flying school, based at Sherburn-in-Elmet Airfield (Sherburn). That course included upset prevention and recovery training (UPRT)[8].

In June 2024, the pilot began an aerobatics rating at a point when he had flown approximately 36 hours as PIC since his PPL was issued (approximately 59 hours since his LAPL was issued). The training consisted of five flights – totalling 5.3 hours – with an instructor over two dates, 13 and 20 June 2024, and separate ground school training. Three flights occurred on the first day of training and two flights on the second day. The pilot's logbook noted that *'spinning'*, and *'spin entry and recovery'* were performed on the first, fourth and fifth flights of that course, and his instructor commented that the fifth flight was purely focussed on practising spins.

The pilot went on to complete a Multi-Engine Piston (MEP) rating in a DA42 aircraft at Sherburn between 10 and 15 July 2024. His logbook recorded three more solo flights, including a land away trip to another airfield, and one of those flights reportedly included aerobatics. On 27 July 2024 – the day before the accident – he flew with a different friend in G-PPFS. He described that flight in his logbook as *'Nav* [and] *aeros'.* Radar data indicated he did not perform any spinning during that flight.

Other information

A number of witnesses mentioned the pilot's enthusiasm for aerobatics as a way to learn more about aircraft handling, and to serve as a break from his professional flying training programme. One witness said he had spoken to them of taking a cautious attitude towards spinning.

The pilot's flying instructors described him as a particularly competent pilot with an enthusiastic and conscientious attitude to flying. He was scheduled to begin IR training at Sherburn on the day after the accident.

Footnote

6 Modular training comprises self-contained courses and qualifications, as opposed to a single integrated course.
7 IR(R) – allows flight in IMC but with more restrictions than an IR.
8 UPRT – teaches pilots to recognise and recover from unusual aircraft attitudes.

Spinning – general information

An aircraft may spin if there is sufficient yaw present as the wing stalls. The wing stalls when the angle at which the airflow meets the wing (angle of attack (AOA)) exceeds a critical angle. Above this critical (stalling) AOA, lift on the wing reduces sharply. A typical way of increasing the AOA as part of the entry into a stall or spin is to reduce power and raise the nose attitude of the aircraft to maintain altitude while the speed reduces.

Yaw refers to the aircraft rotating about its vertical axis. When sufficient yaw is present at the stall, it can lead to a self-sustaining motion whereby the aircraft yaws about its vertical axis and rolls about its longitudinal axis. When this happens, the aircraft enters a sustained spiral descent with the AOA above the stalling angle.

The general recovery technique (subject to aircraft-specific guidance) is to reduce power to IDLE and use full rudder to oppose the yaw and break the self-sustaining roll-yaw coupling. The control column must be moved centrally forwards far enough to reduce the AOA below the stalling angle and un-stall the wing. When the spin stops, the controls must be centred, leaving the aircraft in a steep, nose-down attitude from which it can be recovered to level flight if there is sufficient height available.

Information from reference manuals

Aircraft Flight Manual

The Aircraft Flight Manual (AFM) for G-PPFS states *'Parachutes must be worn during aerobatic flight'* but contains no further guidance on their use. The manual states:

> *'Spins should be practiced at altitudes of 3000 feet… or more above the surface. The normal entry is made from a power-off stall.'*

As the aircraft approaches the stall:

> *'the elevator control should be pulled to the full aft position'* and '*full rudder deflection [should be] reached almost simultaneously with reaching full aft elevator'.*

The normal spin recovery technique given in the AFM is:

> *'(1) Apply full opposite rudder against the direction of rotation.*
>
> *(2) Move the elevator control forward of neutral in a brisk motion.*
>
> *(3) Neutralize aileron control.*
>
> *These three manoeuvres should be done simultaneously.*
>
> *(4) As the rotation stops, neutralize rudder, and make a smooth recovery from the resulting dive. Power should not be reapplied until the airplane is near a level flight attitude.'*

The AFM gave the aircraft stall speed as 48.5 kt CAS at maximum gross weight and with flaps up. The speed was given as CAS because *'indicated airspeeds are unreliable near the stall'.*

Note: CAS is IAS corrected for instrument errors and position errors, which are errors caused by disrupted airflow near the static port (which senses static pressure in the atmosphere). This typically causes the IAS to be less than CAS by 1 to 3 kt near the stall in light aircraft, such as the Cessna 150.

Cessna spin characteristics manual

The Cessna spin characteristics manual offers further information relevant to spinning. The section *'Basic guidelines for intentional spins'* included the following:

> *'Limit yourself to 2-turn spins until completely familiar with the characteristics of your airplane…'*

Describing the *'fully developed "steady" spin phase'* (which typically begins after about two turns), the manual stated:

> *'Because of the strong gyroscopic influences in the spin, improper aerodynamic control inputs can have an adverse effect on the spin motion… it is important, particularly in this steady spin phase, in addition to using the correct control application and proper sequence of control application, to HOLD THIS APPLICATION UNTIL THE RECOVERIES OCCUR. In extreme cases, this may require a full turn or more with full down elevator deflection…*
>
> *The emphasis added to these steps*[9] *differentiates the steady phase from the incipient phase. The most important difference in the steady phase is an increase in length of recoveries in this phase for some airplanes, and to a lesser extent the amount of control input needed.'*

Information from the flying school

The school

The flying school was a Declared Training Organisation (DTO), and its *'Flying Order Book'* (FOB) section on *'Aerobatics and spinning'* stated:

> *'Any flight with the intention of performing aerobatics or spinning has to be specifically authorised and only those manoeuvres as approved shall be flown.'*

The FOB did not require the use of parachutes during aerobatics and spinning, and the school did not offer parachutes to pilots or offer training in their use.

Footnote

9 The 'emphasis' refers to the underlined text in the procedure.

The school's owner (who was also the Head of Training) did not hold a qualification to instruct for the aerobatic rating, and so the responsibility for this training was delegated to suitably qualified instructors within the organisation.

The pilot's aerobatic training

The pilot's instructor reported that he had delivered ground briefings before each flight as part of the aerobatics course, "talking through the manoeuvres, what the pilot could expect to see and feel", and how to link manoeuvres together. He would also discuss what "not to do", and relevant "emergency exit" techniques.

He said they covered a reasonable amount of spinning during the course, focussing on it completely at the end. His training method was to count aloud the first three spin rotations, to get past the incipient stage, before initiating the recovery manoeuvre. For the recovery, he taught that opposite rudder should be applied while pushing the control column forward (with the ailerons neutral), as though the two controls were linked. He described the pilot as very capable and quick to recover the aircraft.

The head of training stated that he discussed the pilot's training with the pilot's instructor, and they were satisfied that all elements of the aerobatic syllabus had been completed satisfactorily, including recovery from spins.

Weight and balance

A weight and balance calculation for the flight showed the aircraft to be within specified limits.

Regulatory information

Flight crew licensing

The CAA's *'FCL.800 Aerobatic rating'*[10] stated:

> *'Applicants for an aerobatic rating shall have completed: (1) after the issue of the licence, at least 30 hours of flight time as PIC in aeroplanes… (2) a training course at a DTO or at an ATO, including… theoretical knowledge instruction appropriate for the rating* [and] *at least 5 hours of aerobatic instruction in aeroplanes…'.*

The related Acceptable Means of Compliance (AMC)[11] document specified that the theoretical knowledge syllabus should cover aspects of human factors and body limitations; technical and legislative subjects; aerobatic manoeuvres and recovery; and emergency procedures, for example, *'use of parachutes (if worn) and aircraft abandonment'*.

Footnote

[10] UK Regulation (EU) No. 1178/2011, Annex I PART-FCL, FCL.800 Aerobatic Rating, available at https://regulatorylibrary.caa.co.uk/1178-2011/Content/Regs/03620_FCL.800_Aerobatic_rating.htm https://www.legislation.gov.uk/eur/2011/1178/annex/I [accessed 11 September 2025].

[11] Acceptable Means of Compliance to UK Regulation (EU) No. 1178/2011 FCL.800 Aerobatic Rating, available at https://regulatorylibrary.caa.co.uk/1178-2011/Content/AMC%20GM%202%20Subparts%20EtoK%20pls%20Annex/AMC1%20FCL%20800%20Aerobatic%20rating.htm [accessed 29 August 2025].

The human factors and body limitations section included spatial disorientation, airsickness, body stress and G forces, and grey- and black-outs. The aerobatic manoeuvres and recovery section included *'planning systems and sequencing of manoeuvres'* and *'entry and recovery from developed spins, flat, accelerated and inverted'.*

CAA Safety sense leaflet

In the *'Human factors'* section of the CAA's Safety Sense leaflet on *'Aerobatics in light aircraft'*[12], guidance is provided on certain *'Attitudes and behaviours'*. It discusses setting personal limitations, and how people can behave differently in dynamic situations compared to those where they have more opportunity to analyse, and/or when other people are present. The section also discusses physical effects, including spatial disorientation and the effects of G-loading.

It is not a CAA requirement to wear a parachute while performing aerobatics, but the *'Protective equipment'* section of the leaflet states that *'If a parachute is worn, be familiar with its operation and regularly rehearse how to abandon the aircraft safely.'*

The leaflet encourages pilots to maintain skills and knowledge, advising them to *'Mentally rehearse the spin recovery, both erect and inverted'.*

Spin recovery video and safety action

The CAA produced a video, *Loss of Control – Stall and Spin Awareness*[13], in response to an incident during which a student and instructor experienced difficulty in recovering from an *'out of control'* spin. The video discusses the importance of pilots knowing and being able to confidently apply spin recovery techniques.

In response to this accident, the CAA said it was considering adding behaviour and attitude aspects to the human factors section of the *'AMC 1 FCL.800 Aerobatic rating'* syllabus. It also intended to publicise the spin recovery video and *'Aerobatics in light aircraft'* Safety Sense leaflet in its ongoing safety promotion work with flying schools. On 11 March 2026, the CAA re-publicised the Safety Sense leaflet through a notification on CAA Skywise[14].

Discussions with other aerobatic flying schools on spin recovery

Discussions with other aerobatic instructors reinforced messages from the Cessna spin characteristics manual, such as the importance of decisive elevator control movement during spin recovery and the importance of seeing a multiple turn spin during training. The Cessna 150 spin recovery was viewed as relatively straightforward but, like other types, a harder push force would be required on the elevator control during a steady spin than during an incipient one. Also, the various forces and "weight of the air" could lead pilots to believe they were pushing further forward than they actually were.

Footnote

12 https://www.caa.co.uk/media/jkxlnrvv/caa9396_safetysense_aerobatics-v5.pdf [accessed 18 March 2026].
13 https://www.bing.com/videos/riverview/relatedvideo?q=caa+video+loss+of+control+-+stall+and+spin+awareness&mid=F24F39D1D4880A353A25F24F39D1D4880A353A25&FORM=VIRE [accessed 18 March 2026].
14 https://skywise.caa.co.uk/ [accessed 17 April 2026].

A common issue mentioned was that the high descent rates during spinning could cause pilots to feel uncertain about pushing (and holding) the control column forward. Pilots could become startled[15] when an aircraft did not recover as expected, causing doubt and leading to inaccurate control inputs.

Human factors

Human responses can be described in a hierarchy of 'knowledge', 'rule', or 'skill' based[16] in order of decreasing conscious thought. As someone learns and practices a given response, it moves from being 'knowledge based' (requiring relatively more conscious thought) to becoming 'skill based' (more automatic in nature).

Survivability

The occupants were not wearing parachutes, and the impact with the ground was unlikely to have been survivable.

Analysis

The accident flight

The pilot departed from Breighton with a friend to perform aerobatics in good weather, and he flew to a rural location and reasonable height before commencing manoeuvres. He performed lookout turns and regained altitude between manoeuvres, which was in accordance with his training.

Using the specified power-off stall technique, when the aircraft slowed to approximately 40 kt the pilot entered the aircraft into a spin to the left. As in his instructional flights he counted to three in reference to the aircraft's rotations before attempting to recover. After the first turn the IAS settled at a value below 35 kt. The AFM gave the aircraft's stalling speed as 48.5 kt CAS, and so it was clear that the wing remained stalled during the descent, even allowing for the fact that the airspeed indicator would show a slightly lower IAS at the stall than 48.5 kt. Consistent with the manufacturer's spin guidance, the aircraft's power remained at IDLE and the ailerons remained close to neutral during the descent. The pilot correctly applied right rudder but it did not appear from the video to have been held consistently in the full right position, and evidence from the video and accident site showed that the aircraft was still rotating (yawing) to the left as it struck the ground.

Guidance on the aircraft's spinning characteristics emphasised that proper recovery control inputs should be held until recovery occurred and that this may require full down (control column forward) elevator deflection for a full turn or more. In this case, as the aircraft descended the elevator control was moved forward initially before moving aft again. In the latter stages of the descent, the control was only slightly forward of the position it had been in as the aircraft entered the spin, which was almost fully aft. At no point was it moved to, or held in, a position that could be described as fully forward. This meant that the AOA

Footnote

15 Startle – an automatic response to a sudden, intense or unexpected stimulus which can impair a person's ability to react appropriately.

16 Rasmussen's '*Skills, Rules, Knowledge'* (SRK) model.

would not have reduced below the critical angle and the wing would have remained stalled, which was confirmed by the airspeed indicator needle remaining below 35 kt. With the yaw continuing and the wing stalled, the aircraft remained in a spin to the left until it struck the ground. This was consistent with the video footage, and evidence from the accident site, which was that the aircraft struck the ground in a nose-down attitude, yawing left and with a high rate of descent.

The pilot's aerobatic instructor reported that during spin training, the pilot had been quick to recover the aircraft on the count of "three". In this case, however, the pilot appeared surprised and startled when the aircraft did not recover quickly from the spin, and he did not realise that the control column remained aft of neutral, thereby preventing recovery.

The use of parachutes

The AFM required pilots to wear a parachute during aerobatic flight. However, wearing parachutes is not a regulatory requirement, it was not required in the FOB, and discussion with aerobatic training providers suggested that it was not common practice during aerobatic training. In this accident, neither occupant was wearing a parachute, and no evidence was found to suggest the pilot had received any training in their use.

Training for spin recovery

Applicants for an aerobatic rating must have flown at least 30 hours as PIC since their licence was issued and, at the end of his aerobatic training, the pilot had flown approximately 36 hours since his PPL was issued and 59 hours as PIC since his LAPL was issued. He had a total time flying of 153 hours. The pilot's aerobatic training consisted of theoretical instruction, and 5.3 hours of flying over two (non-consecutive) days. He therefore met the requirements for the issue of an aerobatic rating but at the time of the accident was still relatively inexperienced in aerobatic flight and spinning.

Spin recovery training is a mitigation against inadvertent spinning during aerobatic manoeuvres, and inadvertent loss of control will probably cause some surprise. When surprised, it is helpful to be able to respond with a well-rehearsed, skill-based recovery procedure requiring little conscious thought, and it is in this context that pilots practise spin entry and recovery techniques. Although the pilot entered the spin deliberately, he appeared surprised when his recovery actions did not lead to the outcome he expected. He had flown for 5.3 hours during his aerobatic rating training, but this had included aerobatic manoeuvres in addition to spin recovery actions, and also included transiting to and from the training area. There was no evidence that he had conducted any spinning in the four flights following his MEP training, although it is possible that he did. Nevertheless, it appeared likely that there had been insufficient spin recovery practice for the recovery technique to move from a knowledge-based response to a skill-based (more automatic) response. It also appeared likely that, once the spin became established, the issues highlighted by the instructors consulted during the investigation became significant in explaining the unsuccessful recovery: a harder push force on the elevator may be required in a fully developed spin; pilots may consider they have pushed the elevator control further forward than they actually have; and the aircraft not recovering as expected may lead to doubt and inaccurate control inputs.

The pilot was known to be sensible and conscientious and there was nothing to suggest that this was not the case in this flight. However, this accident and the CAA 'Loss of control' video highlight how unexpectedly challenging multiple turn spins can be. The CAA's safety sense leaflet advises pilots to mentally rehearse spin recovery, which helps embed a skill-based response that may be effective even when pilots behave differently to how they might expect in dynamic situations and when surprised.

CAA action

The CAA said it was considering adding behaviour and attitude aspects to the human factors section of the AMC syllabus, consistent with guidance in the aerobatics safety sense leaflet.

The CAA's video discussed the importance of pilots being able to confidently apply spin recovery techniques and of using parachutes. In response to this accident, the CAA said it intended to publicise the video and safety sense leaflet during its safety promotion work with flying schools.

Conclusion

The pilot intentionally stalled the aircraft in level flight, applied full left rudder and the aircraft entered a fully developed spin to the left. After three turns, the pilot applied recovery controls but did not move the control column far enough forward to un-stall the wing. The wing remained stalled and the aircraft continued to spin until it struck the ground.

The pilot had qualified for his aerobatic rating after 5.3 hours of flying against a minimum requirement of 5 hours, and he appeared surprised that his recovery actions were not proving effective. It was likely that the spin recovery technique had not yet become a skill-based response that the pilot could apply effectively even when surprised and in a dynamic situation.

Following this accident, the CAA intended to promote to flying schools its safety sense leaflet and video about spin awareness and the use of parachutes. It was also considering expanding its AMC syllabus to include psychological factors.

Published: 30 April 2026.

Accident

Aircraft Type and Registration:	Taylor Monoplane, G-AYSH
No & Type of Engines:	1 Volkswagen 1600 piston engine
Year of Manufacture:	1973 (Serial no: PFA 1413)
Date & Time (UTC):	17 June 2025 at 0936 hrs
Location:	Nayland Airfield, Suffolk
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - None
Injuries:	Crew - 1 (Fatal) Passengers - N/A
Nature of Damage:	Broken canopy and damage to propeller, left main landing gear and spat
Commander's Licence:	National Private Pilot's Licence
Commander's Age:	82 years
Commander's Flying Experience:	1,522 hours (approximately 1,375 on type) Last 90 days - 11 hours Last 28 days - 4 hours
Information Source:	AAIB Field Investigation

Synopsis

G-AYSH, a Taylor Monoplane, took off from Retreat Farm, Essex, with the intention of landing at Nayland Airfield in Suffolk. After landing, the aircraft departed from the mown landing surface into long grass and came to rest inverted. The right main landing gear shock absorber was found to have seized.

A post-mortem examination indicated that the pilot sustained a fatal heart attack, which the investigation concluded is likely to have occurred after landing.

History of the flight

G-AYSH was owned by the pilot and based at Retreat Farm, also known as Little Baddow Airstrip, Essex. The pilot departed at 0922 hrs with the intention of landing at Nayland Airfield, a site he visited regularly and where he had been expected to arrive at approximately 1100 hrs. After taking off from Runway 28, the aircraft climbed on a north-easterly track. After approximately 5 nm from departure, it descended to about 200 ft agl before climbing again to 1,450 ft amsl near Colchester, where it turned north towards Nayland.

The aircraft subsequently established on a straight-in approach to Runway 32. It touched down just before the runway mid-point, veered to the left, departed the mown landing surface into long grass, and came to rest inverted at approximately 0936 hrs. The pilot was discovered at about 1015 hrs by a club pilot arriving at the airfield, who then raised the alarm. The pilot was found unresponsive.

Accident site

The aircraft had travelled approximately 30 m through long grass to the left of the runway, before nosing over. The aircraft's main landing gear left tracks in the long grass where it departed the runway, starting at approximately 250 m from Runway 32's southern end.

The canopy had broken, with all pieces of transparency found next to the aircraft. There had been a fuel leak, but no fire. The aircraft was righted by first responders.

Figure 1

Aircraft position (after righting), viewed from the Runway 32 direction

Recorded information

Introduction

The flight from Retreat Farm to Nayland was recorded by primary[1] radar sites at Stansted Airport, and RAF Wattisham, which were 23 nm to the east of Nayland and 10 nm to the north-north-east respectively. Both radars detected the aircraft shortly after it had taken off, and the aircraft subsequently descended below radar coverage when it was about 1 nm south of Nayland.

Footnote

[1] Primary radar provides the track of an aircraft over the ground but not its altitude.

An Airbox Aware GPS unit was also recovered from the cockpit of the aircraft. The device was developed as part of a joint initiative with NATS[2] in 2009 and provided a moving map display. It also included a recording function which logged GPS-derived position, altitude and groundspeed of the aircraft, once every 10 seconds. The GPS data log was recovered from the unit and decoded with the assistance of its manufacturer. The recording included the accident flight and other flights dating back to July 2020. Of these, 24 were to Nayland.

The aircraft's GPS and radar tracks predominantly correlated with each other, although it was noted that there was some variation at times. This is most likely due to a number of factors, including the relative accuracy of primary radar, the aircraft's distance from the radar head and its radar signature.

GPS devices determine their position by measuring the distance to multiple satellites, with a minimum of four satellite signals required for a GPS receiver to determine its 3D position (latitude, longitude, and altitude). GPS-derived altitude is generally less accurate than barometric altitude as its accuracy can be affected by signal obstructions and atmospheric conditions. The barometric altitude of the aircraft was not recorded, either by the GPS unit or by radar as the aircraft was not equipped with a transponder.

A review of the GPS data showed variance in the recorded altitude when the aircraft was on the ground at the same location but on different dates. The deviation in the data was also not constant (linear), such that the aircraft's altitude on the ground at the departure airfield could underread the actual terrain elevation, but when on the ground at the destination airfield it would overread, and vice versa.

The terrain elevation near the threshold of Retreat Farm Runway 28 is approximately 70 ft amsl. However, the recorded data during the accident flight showed that when the aircraft was close to this position, the recorded GPS-derived altitude was 113 ft amsl (an overread of +43 ft). Several GPS data points were also recorded at Nayland after the aircraft had come to a stop. The GPS-position of these data points were about 55 m north of where the aircraft had actually come to rest. Additionally, the GPS-derived altitude for these data points was 225 ft amsl, whereas the actual elevation of where the aircraft came to rest was about 160 ft amsl (an overread of +65 ft).

Some GPS devices record additional parameters that indicate the vertical and horizontal accuracy[3] of the recorded data, but these were not recorded by the GPS unit. To compensate for the deviation in the GPS-derived altitude during the final data points, an adjustment of -65 ft has been applied. GPS-derived groundspeed was also recorded by the unit and this correlated closely with that derived from the radar data.

Footnote

2 The device was intended to be affordable and help reduce airspace infringements at airports by improving situational awareness.

3 Vertical and horizontal dilution of precision (HDOP and VDOP), provide a measure of how satellite geometry affects the accuracy of altitude (vertical position) and horizonal positions in GPS or GNSS system positioning. Lower HDOP and VDOP values indicates better satellite geometry and, consequently, higher accuracy in determining the position.

Data interpretation

The aircraft took off from Retreat Farm, Runway 28 at 0922 hrs and made a gradual climbing right turn onto a north-easterly heading towards Colchester. It initially climbed to about 800 ft amsl but about five minutes into the flight, when at a distance of about 5 nm from Retreat Farm, the aircraft started to gradually descend at a rate of about 480 ft/min. As it passed between the villages of Tiptree and Kelvedon (Figure 2) the aircraft had descended to 320 ft amsl (about 200 ft agl), but then climbed away progressively; the time was 0928:15 hrs. As the aircraft reached Colchester, it reached an altitude of about 1,450 ft amsl, at which point it altered course towards the north, whilst also starting to gradually descend.

When the aircraft was 1.6 nm from the airfield, it turned onto an inbound course for Runway 32. At this point the aircraft was at an altitude of 1,050 ft amsl and its average descent rate was about 580 ft/min. As the aircraft approached the runway, its airspeed gradually started to reduce and when it was approximately 250 m from the runway threshold (Figure 3), its estimated airspeed was about 64 kt and it was at approximately 230 ft amsl (a height of about 180 ft agl). The next GPS-derived data point was positioned overhead the runway, with the aircraft at a height of approximately 70 ft agl and with an estimated airspeed of 62 kt. The next GPS data point, recorded 10 seconds later, showed that the aircraft was no longer on the runway, but in the long grass to the left of it, and travelling at a ground speed of 40 kt; the time was 0935:55 hrs. The next GPS data points were recorded at the identical position but with the aircraft no longer moving.

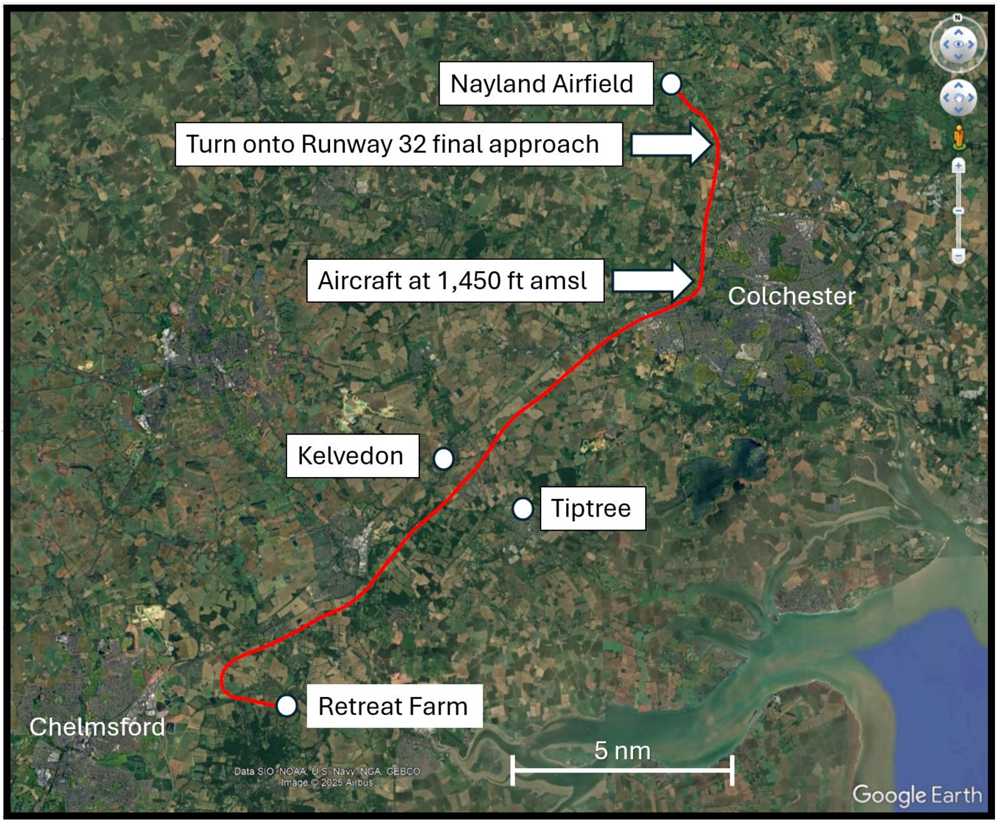

Figure 2

GPS track from Retreat Farm to Nayland

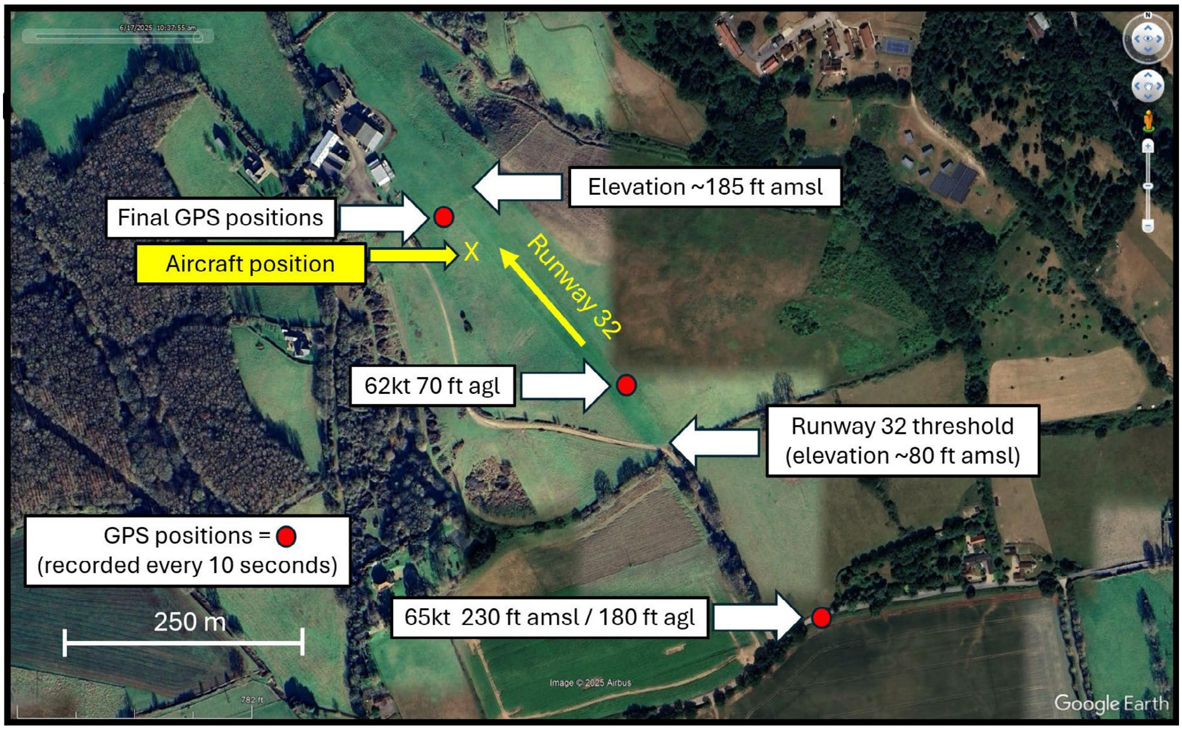

Figure 3

Final GPS points

Previous flights to Nayland

GPS data for the previous landings at Nayland showed that the pilot had flown straight-in approaches as well as overhead joins to land on Runway 32.

A review of the six previous landings at Nayland (26 April 2025, 17 August 2024, 11 November 2023, 5 October 2023, 30 September 2023 and 23 September 2023) showed that the aircraft's position, height and speed during the final stages of the approach were consistent with that during the accident approach.

The data also showed that during these flights, the pilot on several occasions had also descended when approaching the villages of Tiptree and Kelvedon; reaching a minimum height of about 500 ft agl. During two of the flights, he had orbited in the area before flying on to land at Nayland.

Aircraft information

The Taylor Monoplane is a single-seat plans-built aircraft, of wooden construction. G-AYSH was constructed by the pilot in 1971, had flown 1,375 airframe hours, and had a valid Permit to Fly. The aircraft is fitted with a VW 1600 engine and wooden propeller.

Landing gear

G-AYSH has a fixed tailwheel, and main landing gear fitted with telescopic sprung shock-absorbers. The main landing gear design is specific to this aircraft. The mainwheel, brake and spat are mounted to a lower cylinder housing and axle assembly.

A cylinder containing two springs fits within the cylinder housing, and into an upper mounting affixed to the wing spar. Scissor links attach the cylinder housing to the upper mounting.

Upon compression, the cylinder housing slides over the cylinder. A metering pin in the cylinder housing pushes against a collar in the cylinder, compressing the springs to provide shock absorption. An aluminium sleeve fitted to the outside of the cylinder moves with the compression within the cylinder housing, exposing orifices along the cylinder's length. Oil travels up through the metering pin, exiting via the orifices to provide lubrication and a level of damping. This action is shown in Figure 4.

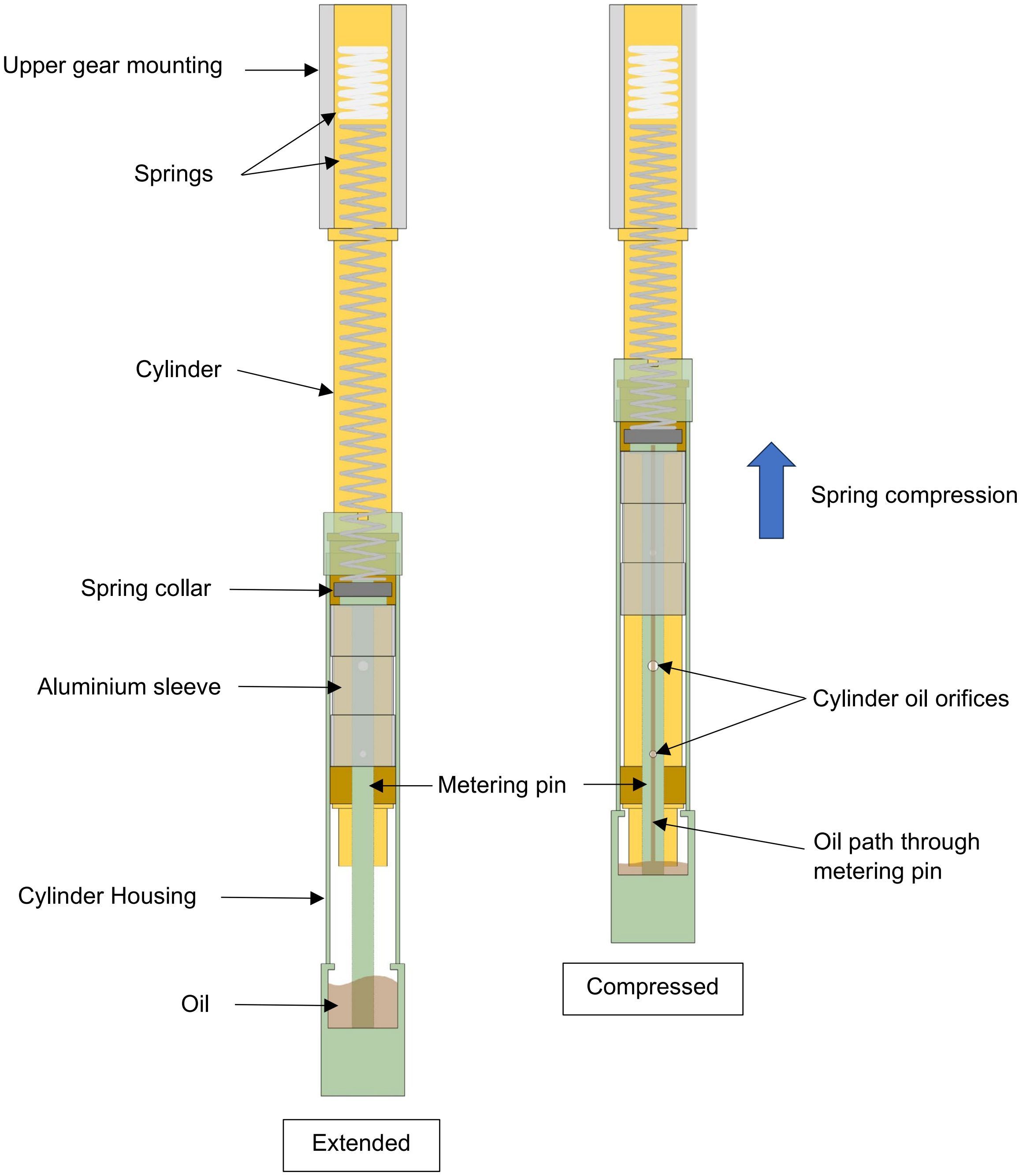

Figure 4

G-AYSH main landing gear shock absorber operation

Aircraft examination

General

All flying controls were found to be connected and operated as expected. The rudder had sustained some damage to its tip and was jammed in a slight left deflection. G-AYSH was fitted with flaps and these had been deployed to their first setting.

The propeller and spinner were attached. One blade was split along its length from the centre of the tip, while the other was undamaged.

The throttle, choke and alternate air cable controls were all connected, and operated as expected. Fuel was present, and approximately 25 litres was drained from the fuel tank.

The canopy frame was damaged, and the transparency was broken into multiple pieces. The fixed tailwheel was undamaged.

Main landing gear

Both main landing gears were attached, turned freely, and fitted with tyres in good condition. The left wheel spat was cracked and distorted while the right spat was undamaged. Both main landing gear brakes were connected to the brake pedals and were functional.

The left main landing gear cylinder showed evidence of compression, identified by a defined line in the grease accumulation (Figure 5). There was a cleaner, lightly oiled section of outer surface where it slides into the cylinder housing. With light downward force applied, the gear compressed freely and returned to its extended position unaided.

Figure 5

Left and right gear cylinders

The right main landing gear's cylinder surface in comparison was drier with a poorer finish. Light downward force was applied, but the cylinder was found to be seized in position. With further force, the gear compressed but did not rebound, remaining in its compressed state. It was possible to re-extend the cylinder by hand. Approximately 35 ml of oil was drained from the left cylinder housing, and 15 ml of oil from the right.

The left and right main landing gear assemblies were removed from the aircraft and stripped to their component parts. Both left and right cylinders and cylinder housings were measured for alignment.

Right landing gear

The right cylinder was found to be out-of-true by 8.24 mm between centres over its length. The mid-point deflection from centreline to outer surface was 4.17 mm (Figure 6).

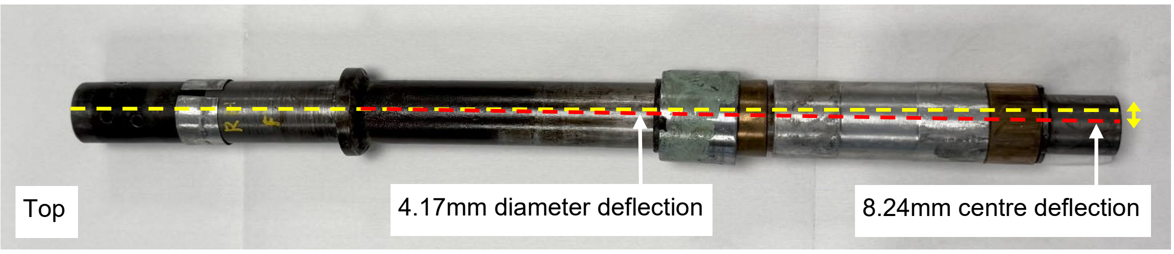

Figure 6
Right cylinder measurement

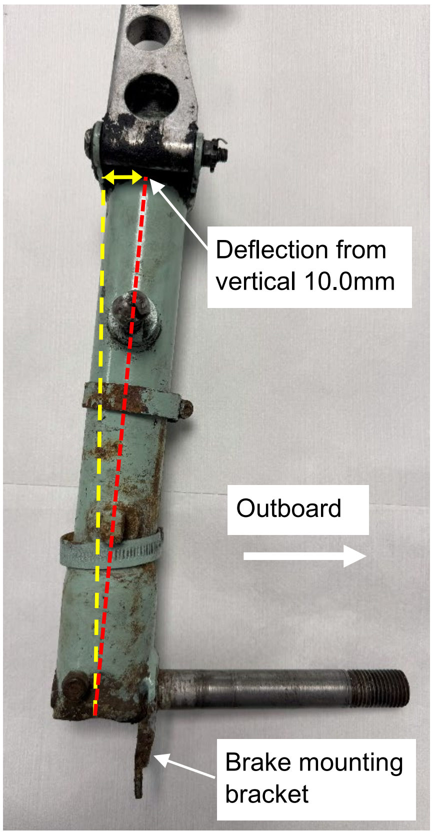

Figure 7
Right cylinder housing measurement

The top of the cylinder housing was deflected 10.0 mm outboard in comparison with the base (Figure 7). The brake mounting bracket on the bottom of the cylinder had been damaged previously and a welded repair applied, which was overpainted.

Inside the right cylinder, there were witness marks from the springs fretting against the inner surface. The longer main spring showed corresponding areas of wear on the outside of the coils (Figure 8). The shorter spring's outside edges had been ground to a squared-off finish; the inside edges of the coils were rounded. The outer coil surface finish was rough, and they were not consistently circular in shape.

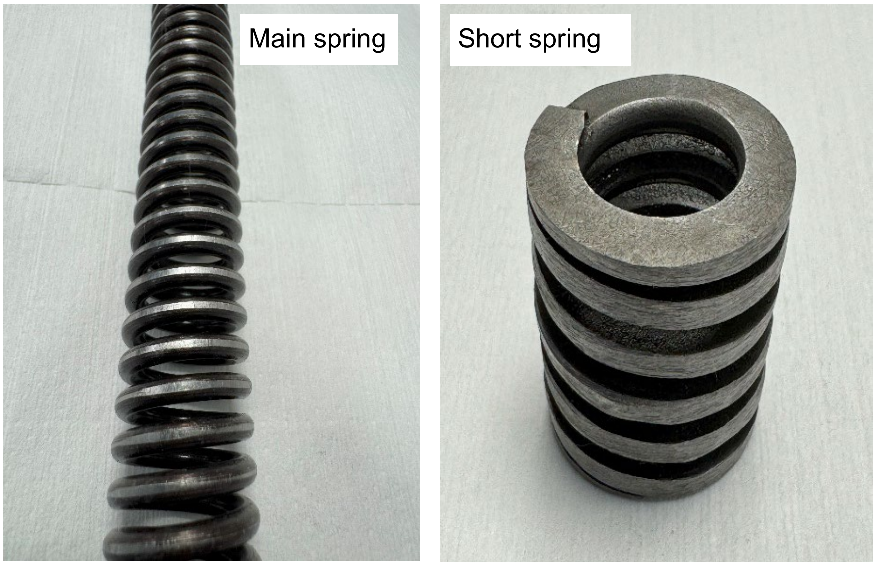

Figure 8
Right landing gear springs

Left landing gear

The left cylinder had a 0.3 mm deflection measured at its mid-point and the cylinder housing was straight. There were some small areas of fretting between the longer spring's outer edges and the inner surface of the oleo. The shorter spring was similar in appearance to that in the right cylinder.

Airfield information

Nayland is a privately owned, unlicensed airfield located five nautical miles north-west of Colchester, at an elevation of 180 ft amsl. The preferred method of joining the circuit for Runway 32 is via the overhead, into a left-hand circuit. Runway 32 has an upslope gradient of approximately 5.5 % over its length. However, the initial 320 m has an upslope of about 9.5 %. The touchdown point and final position of G-AYSH were not visible from the clubhouse (Figure 9).

Figure 9
Nayland Airfield looking along Runway 32

Pilot information

The pilot held a current NPPL(A), issued in 2008 with a Simple Single Engine Aircraft rating. He had flown approximately 1,522 hours, of which the majority were on G-AYSH.

Medical

Pilot medical declaration

The pilot submitted a Pilot Medical Declaration in February 2024, which was valid until February 2027.

Post-mortem report

Post-mortem examination of the pilot concluded that he died as a result of a heart attack.

Analysis

The flight

The pilot was a frequent visitor to Nayland, his most recent flight there taking place on 26 April 2025. A post-mortem examination determined that he died of natural causes; however, the investigation could not conclusively establish the point at which the fatal medical event occurred. The descent to approximately 200 ft agl near the villages of Tiptree and Kelvedon does not appear to indicate partial incapacitation or distraction due to a developing medical condition, as data from previous flights show similar flight profiles, including orbits in the area. Furthermore, the pilot subsequently climbed to 1,450 ft and continued towards Nayland for an additional eight minutes rather than returning to Retreat Farm or carrying out a precautionary landing in a nearby field. Although the normal procedure was to join the circuit via the overhead, he had made straight-in approaches on previous occasions. A review of the six previous landings at Nayland showed that the aircraft's position, height, and speed during the final stages of the approach were consistent with the profile of the accident flight.

The investigation concluded that the pilot likely suffered a fatal heart attack at some point after landing at Nayland. He was not discovered for approximately 39 minutes after landing because the aircraft was not visible from the clubhouse due to the upsloping runway, and his arrival was not expected until 1100 hrs. Consequently, the straight-in approach, landing and subsequent departure from the runway went unnoticed.

Engineering

The aircraft appeared to have been configured for landing with a stage of flap deployed. All flight control surfaces and engine control continuity was established, with no evidence of any pre-existing restrictions. The damage to the propeller corresponded with the blade's tip striking soft ground and stopping within one rotation. This was likely as the aircraft nosed over. The canopy damage was proportionate with the nose-over event and actions of the first responders. There were no significant ground marks on the runway surface to suggest a heavy landing.

The right main landing gear shock absorber was found to be partially seized and had no rebound. Examination revealed that both the cylinder housing and the cylinder were bent outboard, likely from a historic event due to the amount of main spring outer coil wear and the presence of an overpainted repair. The misalignment of the cylinder and housing led to reduced ability for the cylinder and sleeve assembly to slide within the cylinder housing, resulting in an imbalance in compression between the right and left landing gear assemblies. The condition of the right leg cylinder's outer surface in comparison to the left indicates it may have had restricted compression for some time. The reduced amount of oil recovered from the right cylinder housing would have had contributed to a lower level of damping available if the cylinder was moving normally.

If the left shock absorber compressed as usual but the right was seized during the landing of the accident flight, it is possible that this could contribute to a left veer on landing.

Conclusion

Shortly after landing, G-AYSH departed from the landing surface into long grass and inverted. The right main landing gear shock absorber was found to have seized, which may have contributed to the aircraft veering to the left during landing.

The pilot sustained a fatal heart attack, which the investigation concluded likely occurred after the landing.

Published: 2 April 2026.

Accident

Aircraft Type and Registration:	Hoffmann H36 Dimona, G-CIMC
No & Type of Engines:	1 Limbach L 2000-EB1C piston engine
Year of Manufacture:	1988 (Serial no: 36269)
Date & Time (UTC):	8 April 2025 at 1025 hrs
Location:	Darley Moor Airfield, Derbyshire
Type of Flight:	Introductory flight
Persons on Board:	Crew - 1 Passengers - 1
Injuries:	Crew - 1 (Fatal) Passengers - 1 (Fatal)
Nature of Damage:	Aircraft destroyed
Commander's Licence:	Airline Transport Pilot's Licence (Aeroplanes)
Commander's Age:	66 years
Commander's Flying Experience:	17,185 hours (of which 9 were on type) Last 90 days - 74 hours Last 28 days - 16 hours
Information Source:	AAIB Field Investigation

Synopsis

The accident occurred on an introductory flight experience bought for the passenger by a family member. At very low level in the moments after takeoff, the aircraft was seen to start "wallowing" before it rolled rapidly right and fell to the ground in a steep nose-down attitude from approximately 100-150 ft agl. The impact forces were unsurvivable for both pilot and passenger.

Recorded data showed that G-CIMC's lift off from the runway was as expected, but the aircraft then began yawing to the right and was subsequently unable to maintain a safe climbing speed or trajectory. The "wallowing" observed by several eyewitnesses was suggestive of an aircraft at or close to the aerodynamic stall. The investigation was unable to determine why the aircraft did not climb normally or what factors contributed to the pilot not being able to carry out a successful forced landing when the achieved climb performance was not as expected. The investigation did not find evidence of any technical issue that might have limited engine performance. An anthropometric study found the potential for fouling of the controls meant that an inadvertent throttle reduction was a possibility and that inadvertent movement of the trim was possible but not likely.

The investigation did not find an auditable record of weight and balance (WB) calculations made by the pilot on the day and, although the pilot had been observed preparing the aircraft for flight, the Daily Inspection (DI) book had not been signed. The aircraft had a relatively limited maximum payload of 170.6 kg, although an error in the aircraft's most recent weighing report stated the payload limit was 184 kg. The investigation calculated that G-CIMC's payload on the accident flight was approximately 206 kg. While the aircraft took off above its maximum approved mass, the investigation considered that to be a contributory, rather than causal, factor.

The operating club has taken safety action to amend its flight booking processes to require the completion of an online data capture and flight waiver form by customers before any flight experience is scheduled. Boarding weights declared on those forms would then be checked at the airfield before a passenger's first flight.

The British Gliding Association (BGA) wrote to its member clubs reiterating guidance on introductory flights and highlighting the importance of flight preparation. It also plans to issue a notice to all its inspectors highlighting the need to identify all relevant information, including a non-lifting parts limitation, when producing aircraft weighing reports.

History of the flight

The accident occurred shortly after takeoff on a passenger introductory flight from Darley Moor Airfield, Derbyshire (Darley Moor) in a Hoffmann H36 Dimona (Dimona) touring motor glider (TMG).

The pilot arrived at the airfield at approximately 0800 hrs on 8 April 2025, after which, he began preparing G-CIMC for flight. At some point after 0800 hrs, a witness reported seeing the pilot carrying two 20 litre jerrycans to the aircraft before later returning them to their storage location. The jerrycans had been filled to full with Super Unleaded 98 RON[1] Mogas at a local petrol station on the morning of 7 April 2025, and some of that Mogas was used to refuel G-CIMC for its two flights that day. The witness reported that, from the ease with which the pilot was carrying the jerrycans, they appeared to be empty when he returned them to the storage point. Neither the quantity of fuel uplifted nor the total fuel onboard for the accident flight was recorded.

The passenger arrived at the airfield about an hour after the pilot and was greeted outside the clubhouse by one of the club's officers who was busy briefing their own student pilot at the time. The pilot then met and escorted the passenger directly to the aircraft. The passenger did not enter the clubhouse. The club officer later helped the passenger strap into G-CIMC's left seat. The officer reported the pilot and passenger were in good spirits, there was no obvious time pressure, and the pilot did not appear to be rushing.

After engine start, the aircraft taxied to Runway 01 (Hard)[2] for takeoff. A witness familiar with flying G-CIMC, reported the takeoff appeared to start as expected and that the aircraft's ground roll was of a "normal" length. Shortly after lifting off, the aircraft began to yaw right and track east of the runway extended centreline. The composite image at Figure 1 shows G-CIMC's heading change after lift off and is compiled from the final 13 seconds of a video recording of the takeoff.

Footnote

[1] Research Octane Number.
[2] See *Airfield details* section.

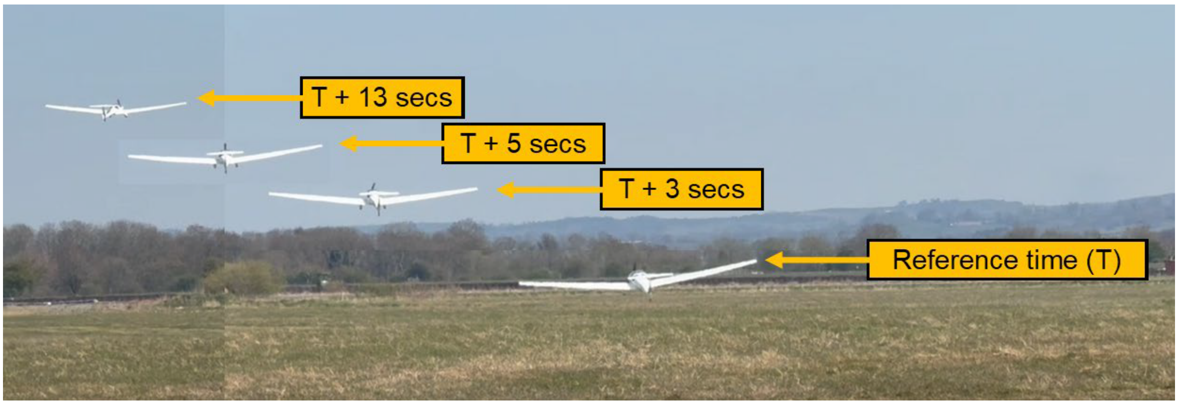

Figure 1

Composite image showing initial yaw and heading change after lift off
(Reference time (T) is close to, but not precisely coincident with, lift off)

Witnesses reported that shortly after the initial climb away from the runway the aircraft began "wallowing", with the nose pitching up and then down as if it was repeatedly approaching the aerodynamic stall. After two or three such pitch oscillations, the aircraft rolled rapidly right and fell "vertically" to the ground in a nose-down attitude, from a visually estimated maximum height of 100-150 ft agl. Eyewitnesses reported the engine sounded "normal" during the early stages of the takeoff run. They were not able to say whether the engine note later changed because by the time the aircraft was seen to be in obvious difficulty it was out of earshot.

Both occupants were fatally injured at impact. There was no post-crash fire.

Accident site

The aircraft struck the ground in a steep nose-down pitch attitude, with the aircraft coming to rest on top of the main ground impact marks. All parts of the aircraft were present at the accident site. The tailplane detached in the impact. The fuselage was broken behind the cockpit, but this section remained attached by the rudder cables. Both occupants remained in their seats with the seat harnesses fastened. No significant fuel leak had occurred and 25 litres of fuel, with the appearance and odour of Mogas, was recovered from the aircraft fuel tank.

Onsite examination of the engine was restricted to removal of both carburettor float bowls. Both float bowls contained clean fuel, and no water contamination or excessive debris was present in the bottom of the bowls.

Recorded information

The initial takeoff was videoed from the airfield, the recording stopped shortly after lift off. Visual propeller rotation analysis and doppler compensated audio analysis of the recording, indicated the engine rpm was approximately 2,910 rpm, in line with normal expectations.

The pilot used an aviation app on a tablet during the accident flight which recorded the flight path. The flight path and associated data is shown in Figure 2.

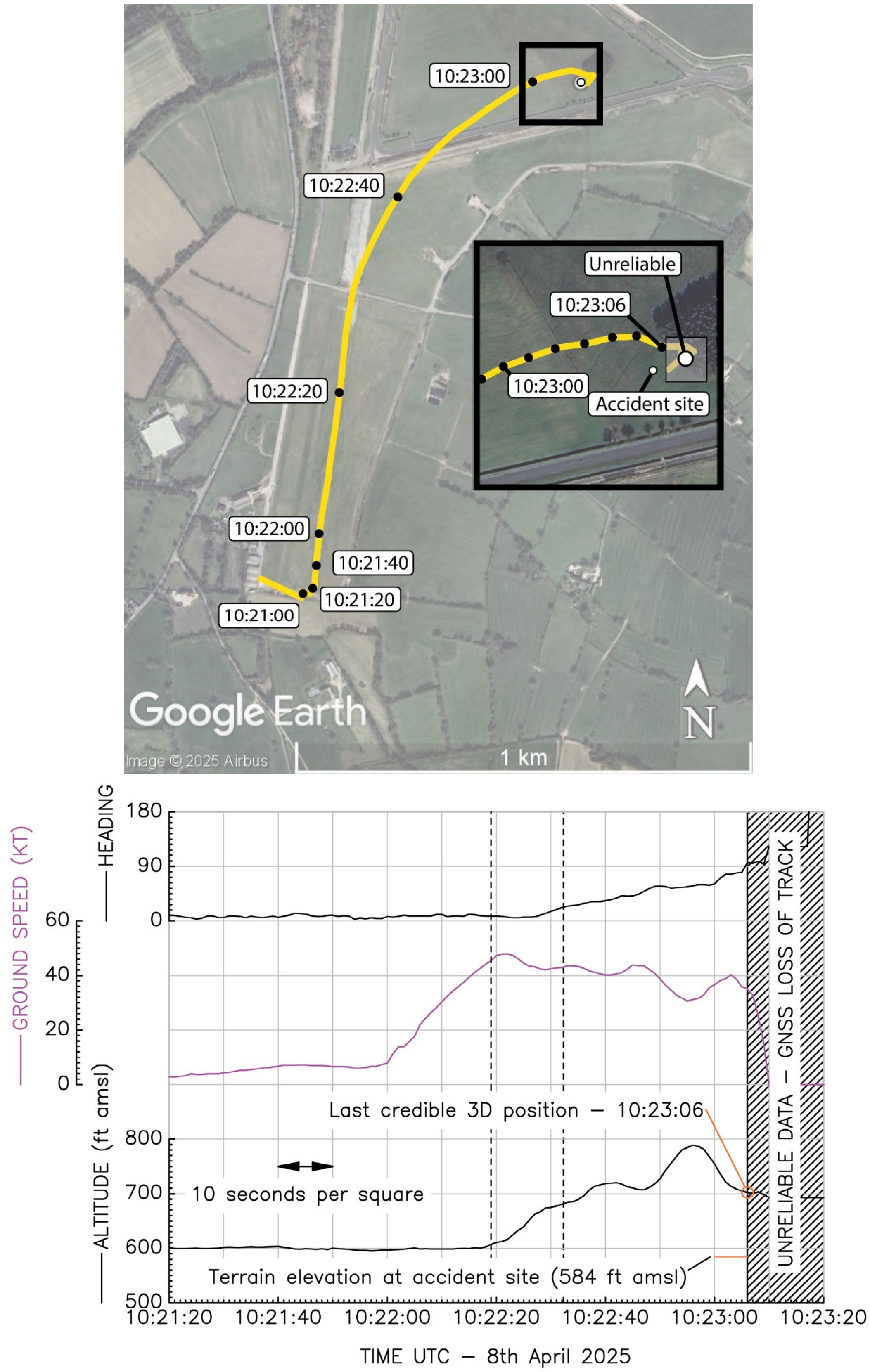

Figure 2

Flight path and data. The left dashed line in the data plot is the rotation point captured by the video and the right dashed line marks the end of the video

The aircraft position was sensed using GNSS technology, which is not designed for accurately tracking dynamic flight. The data associated with the final seconds of the accident flight were found to be unreliable. This is indicative of the GNSS antenna no longer being able to detect satellite signals, either because it moved to an unfavourable place in the cockpit (if for example using the tablet's GNSS sensing capability) or the attitude of the aircraft itself changed significantly, pointing the antenna away from the sky.

Without accurate local wind data, it was not possible to derive a meaningful airspeed plot from the recorded groundspeed. While the investigation did not find a recording of the local surface wind velocity at the time of the accident, it was likely from an easterly direction at less than 10 kt[3].

Aircraft information

The Dimona is a two-seat TMG powered by a Limbach L2000 EB1C four-cylinder piston engine. The engine is equipped with two Solex carburettors, one supplying the right cylinders with a fuel-air mixture and the second supplying the left cylinders. The seats are arranged side-by-side, with dual flying controls. The primary flight instruments are positioned on the left side of the instrument panel and the Dimona Aircraft Flight Manual (AFM)[4] includes a limitation that '*solo flights may be conducted from the left seat only*.'

The engine directly drives a propeller that may be set in one of three pitch positions during flight; fine pitch for takeoff and landing, coarse pitch for cruising, and feather during soaring flight with the engine switched off. The AFM states that a minimum engine rpm of 2,700 is required for takeoff, achieving this requires the propeller to be set to fine pitch. In some sections of the AFM, the terms START and CRUISE are used respectively for the fine/takeoff and coarse pitch settings.

The aircraft is constructed primarily from glass fibre composite materials and has a fixed main landing gear and tailwheel. Its fuel tank has a capacity of 83 litres and is approved to use either Avgas 100LL fuel or Mogas fuel with a minimum 98 RON octane rating.

The aircraft was maintained under the BGA's Combined Airworthiness Organisation (CAO). An annual maintenance inspection was completed on 7 March 2025, with the aircraft records stating that the aircraft had flown 1,142 hours and the engine had 165 hours in service since overhaul, at that date. The aircraft's Airworthiness Review Certificate was also renewed on 7 March 2025. The aircraft had flown 5.2 hours since the annual maintenance inspection.

The aircraft was last weighed on 22 September 2024 and this aircraft weighing report was present in the aircraft's technical records.

Aircraft examination

Footnote

3 See *Meteorology* section.
4 H36-AFM-GB-Int_through_SN36220 and H36-FHB-Ausgabe-1987-01-26 (German language version).

Examination of the aircraft's engine did not reveal any pre-accident mechanical or electrical defect that could cause the engine to run roughly or lose power. The engine's ignition system was examined in detail and found to function correctly.

The aircraft's flying controls, engine controls and propeller controls were examined and no pre-accident defect or discontinuity was identified. It was not possible to determine the pre-impact positions of the engine or propeller controls due to accident-related disruption.

The airframe fuel filter was free from debris and the electric fuel boost pump operated when connected to 12 Volt power. No pre-accident restriction in the fuel lines between the fuel tank and the fuel selector valve was identified. The fuel lines forward of the fuel selector valve to the engine were crushed due to the accident impact, preventing assessment of their pre-accident condition.

The aircraft's DI book did not contain an entry for the date of the accident. It did contain previous entries with the last entry dated 7 April 2025, stating that no minor defects were present.

Weight and balance (WB)

Section 2 *'Limitations'* of the AFM specifies a maximum gross weight limit for the aircraft type of 770 kg. In addition to that limit, section 1.8 of the AFM specifies a maximum weight limit for non-lifting parts of 560 kg. The maximum permissible payload is the lesser of:

(1) The maximum gross weight limit minus aircraft empty weight; or

(2) The maximum weight limit for non-lifting parts minus the weight of the aircraft's non-lifting parts.

The most recent weighing report obtained by the AAIB was dated 22 September 2024 and recorded G-CIMC's empty weight as 585.6 kg and that of its non-lifting parts as 389.4 kg. Based on those figures, the limiting factor for payload was the weight of non-lifting parts:

- 560 kg (limit) – 389.4 kg (actual weight of non-lifting parts) = 170.6 kg

The weighing report incorrectly stated the maximum payload available was 184 kg which equated to condition (1), maximum gross weight limit minus the empty weight[5] (Figure 3). This incorrect available payload figure had been transposed by a handwritten amendment onto blank 'w*eight & balance calculation sheets*' found with the aircraft (Figure 4). The WB sheets were inside a '*General Info*' folder produced by the previous owners of the aircraft who had also commissioned the weighing report. These WB sheets did not include reference to the weight of the aircraft's non-lifting parts or the related AFM limit. Applying the non-lifting parts limit, the maximum allowable takeoff mass for G-CIMC was 756.2 kg[6].

Footnote

5 Approved maximum takeoff mass 770 kg – Aircraft empty weight 585.6 kg = 184.4 kg.
6 Empty aircraft weight 585.6 kg + limiting payload 170.6 kg = 756.2 kg.

Empty Weight & C of G Position:

Weight on Front Right Hand Wheel	260.5 kg	Displacement of Front Support (Xf:	235 mm Fwd
Weight on Front Left Hand Wheel	253.1 kg	Displacement of Front Support (Xf:	235 mm Fwd
Total Weight on Main Wheels (Wf):	513.6 kg		
Weight on Rear Support (Wr):	72.0 kg	Displacement of Rear Support (Xrs	4700 mm Aft
		Weight of Port Wing (Wp):	97.3 kg
		Weight of Starboard Wing (Ws):	98.9 kg
		Weight of Non-Lifting Parts (Wnl):	389.4 kg
Empty aircraft C of G position (Xe):	**371.8 mm AOD**	**Empty aircraft Weight (We):**	**585.6 kg**
Empty aircraft Total Moment:	**217704 kg mm**	**Maximum Payload Available:**	**184 kg**

Figure 3

Extract from G-CIMC weighing report dated 22 September 2024

DIMONA H36 Mk 2; G-CIMC

WEIGHT & BALANCE CALCULATION SHEET

Current empty weight is:		(~~May 2016~~) SEPT 2024	~~584~~ 586 kgs
Maximum all-up weight is:			770 kgs
Available payload is:			~~186~~ 184 kgs
Avgas 100LL weight per litre:	(specific gravity = 0.72)		
Mogas weight per litre:	(specific gravity = 0.73)		
1 Litre weighs:			0.73 kgs
10 Litre weighs:			7.3 kgs
20 Litre weighs:			14.6 kgs
30 Litre weighs:			21.9 kgs
40 Litre weighs:			29.2 kgs

Calculation Examples:

Pilot 1:	80.0 kgs	Pilot 1:	75.0 kgs
Pilot 2:	70.0 kgs	Pilot 2:	85.0 kgs
Fuel to gauge white line:	14.6 kgs	+ 10 litres =	21.9 kgs
Total All-Up Weights:	164.6 kgs		181.9 kgs
Available loading in the above examples are:			
	770.0 kgs		770.0 kgs
584 + 164.6 =	748.6 kgs	584 + 181.9 =	765.9 kgs
Gives spare capacity of:	21.4 kgs		4.1 kgs

OR:

Available payload:	~~186.0~~ 184.0 kgs
Less total calculated all-up weight:	164.6 kgs
This gives spare capacity of (about 30 litres extra fuel):	21.4 kgs

Actual Calculation for Flight – COMPLETE THE WEIGHT DETAILS	
Pilot 1 weight	kgs
Pilot 2 weight	kgs
Luggage (Max. 12kg)	kgs
Fuel weight (insert figure from above fuel weights)	kgs
Current empty weight of a/c (as of ~~May 2016~~) SEPT 2024	~~584.0~~ 586.0 kgs
TOTAL All-Up Weight (must not exceed 770 kgs):	kgs

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Figure 4

Scanned blank WB sheet recovered from the '*General Info*' folder found in G-CIMC

It was not a regulatory or club requirement for pilots to complete WB forms for each flight, and the investigation did not find completed WB forms for any of G-CIMC's flights flown from Darley Moor.

The club reported it possessed a readily available set of scales which could be used to check the boarding weights of pilots and passengers. Rather than following a formalised routine or procedure for weighing introductory flight passengers, the scales were used on an ad hoc basis when somebody's weight was judged by visual assessment to be a potential issue.

Prior to the accident flight, the passenger was escorted directly to the aircraft after arriving at the airfield, this meant his boarding weight was not measured at the club before the flight.

Postmortem examinations found the pilot's boarding weight to be 75 kg, and that of the passenger to be 113 kg. Each seat in the aircraft has a maximum mass limit of 110 kg. While the investigation was unable to determine the exact fuel load, 25 litres (18 kg) of Mogas were recovered from the aircraft. Based on the payload weights above, G-CIMC's gross weight at takeoff was at least 791.6 kg[7], approximately 35 kg above the maximum allowable takeoff weight for non-lifting parts. The investigation calculated that the aircraft's longitudinal centre of gravity (CG) position would have been between the fore and aft datum limits, but the aircraft's takeoff weight being above the maximum gross weight limit placed the aircraft outside the approved CG envelope (Figure 5).

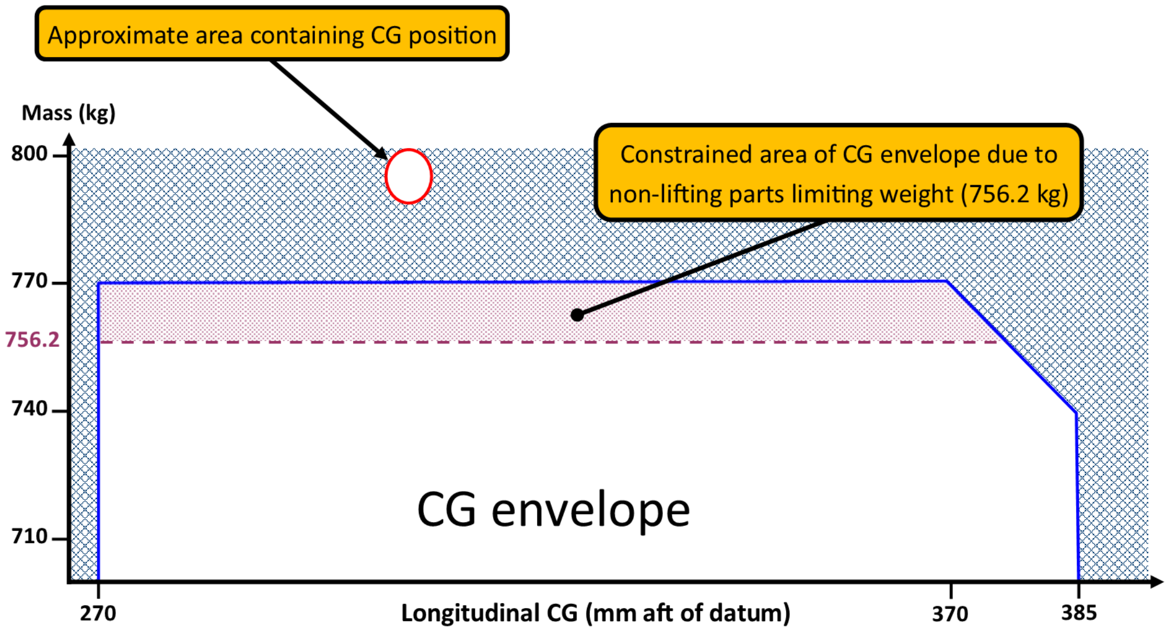

Figure 5

Dimona CG envelope showing the approximate longitudinal CG position for G-CIMC on the accident flight

Footnote

[7] Aircraft empty weight 585.6 kg + pilot 75 kg + passenger 113 kg + recovered fuel 18 kg = 791.6 kg.

Aircraft performance

The Dimona type was approved in accordance with the German airworthiness certification requirements for gliders and motor gliders (LFMS[8]). LFMS certification standards require motor gliders to be capable of climbing to 300 m agl within 4 minutes of takeoff, but detailed performance data does not need to be published.

The Dimona AFM quotes expected climb rates at 15°C and sea level of:

- 2.7 m/s[9] while climbing at 95 km/h (60 mph/51.3 kt) with the propeller in the START position, and
- 2.0 m/s while climbing at 120 km/h (75 mph/64.8 kt) with the propeller in the CRUISE position.

The AFM-prescribed takeoff and climb speeds for the Dimona are 80 km/h (50mph/ 43.2 kt) and 85 km/h (53 mph/45.9 kt) respectively. The investigation was unable to obtain data relating to how the amount of aerodynamic drag acting on a Dimona might vary with airspeed reductions below the AFM climb speed.

The Dimona AFM quotes a power-off stall speed, with air brakes retracted, of 70 km/h (44 mph/38 kt). An indicative airspeed for a power-on stall is not given but the characteristics are described as follows:

> *'On coming [sic] stall warning can be recognised by buffeting on the aircraft and a loss of positive control in the stick and pedals. If permitted to continue the aircraft will stall and roll over on the stalled wing. A spin may result. When buffeting is encountered relax back pressure on the stick, and if available, add power. Recovery from a clean stall will result in an altitude loss of about 40 meters (130 feet).'*

Meteorology

The weather conditions at the time of the accident were generally fine and stable, with light and variable winds, and no low cloud. Local weather stations reported temperatures of around 8°C at 0800 hrs, rising to 13°C by 1200 hrs.

Figure 6 reproduces the UK low-level spot wind forecast (Form 214) for 1200 hrs on 8 April 2025 which was published by the Met Office and valid for the period 0900-1500 hrs. Darley Moor Airfield's location is approximately 53°N/001°45'W. Interpolation using the spot wind tables around that latitude and longitude indicated that below 5,000 ft the mean wind speed was forecast to be 5 kt. The wind direction would have been variable, most likely

Footnote

[8] Lufttüchtigkeitsforderungen für Segelflugzeuge und Motorsegler (LFMS).
[9] Shown as 2.8 m/s in H36-AFM-GB-Int through SN36220 (English version of the AFM).

trending from an easterly, rather than westerly, direction. At 1020 hrs East Midlands Airport, 17 nm south-east of Darley Moor, reported their surface wind as 080°(variable between 030° and 170°)/5 kt. An automatic weather recording station 18 miles east of Darley Moor recorded wind velocities of 110°/5 kt at 1000 hrs and 080°/6 kt 1100 hrs.

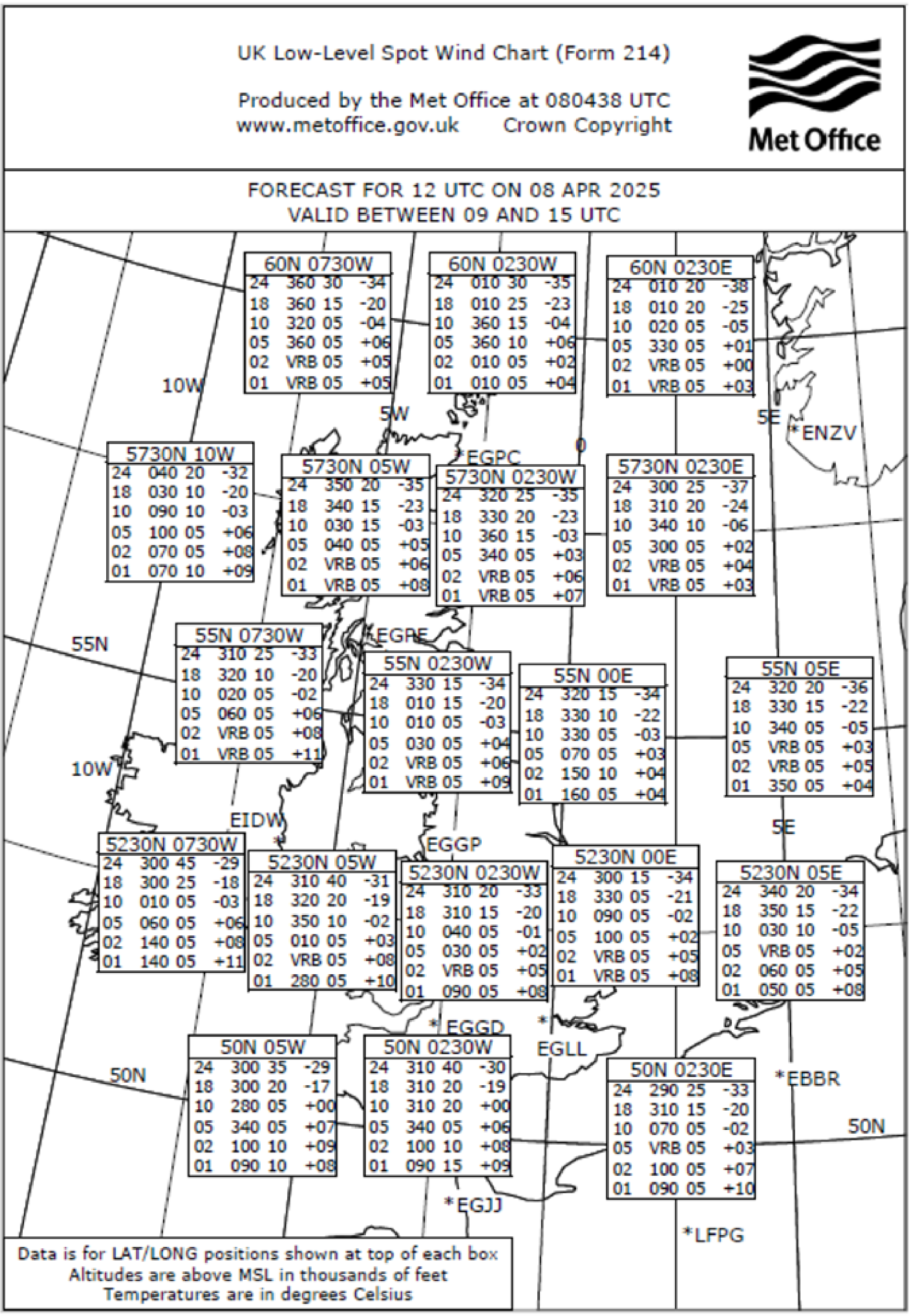

Figure 6

Met Office Form 214 valid between 0900 and 1500 on 8 April 2025

Local wind effects for individual airfields are not reflected in the UK-wide forecast on Form 214 but the operator reported that '*easterly winds are accentuated at Darley Moor with altitude due to the venturi influence of its geographical position with respect to the Peak District hills*.' The investigation did not find accurate surface or low-level wind data measured in the immediate vicinity of the airfield but was provided with video evidence of the local environmental conditions, filmed approximately 10 minutes after the accident. Figure 7 is a screenshot from that video, captured when the camera was facing in a south-south-westerly direction towards the airfield windsock. Referencing the fence in the foreground which is aligned approximately east-west, this image indicates the surface wind was easterly at around 5 kt when the video was taken.

Figure 7

Screenshot showing airfield windsock at approximately 1035 hrs on 8 April 2025

Airfield information

Darley Moor is an unlicensed airfield approximately 2 nm south of Ashbourne in Derbyshire. The active airfield area occupies the southern section of a disused wartime aerodrome. The northern section of the disused aerodrome is used as a vehicle racing circuit (Figure 8). Runway 01 (Hard) is formed from the southern end one of the wartime aerodrome's original concrete runways. In recent years the deteriorating concrete was overlaid with matting re-purposed from artificial sports pitches to make it smoother and more weatherproof.

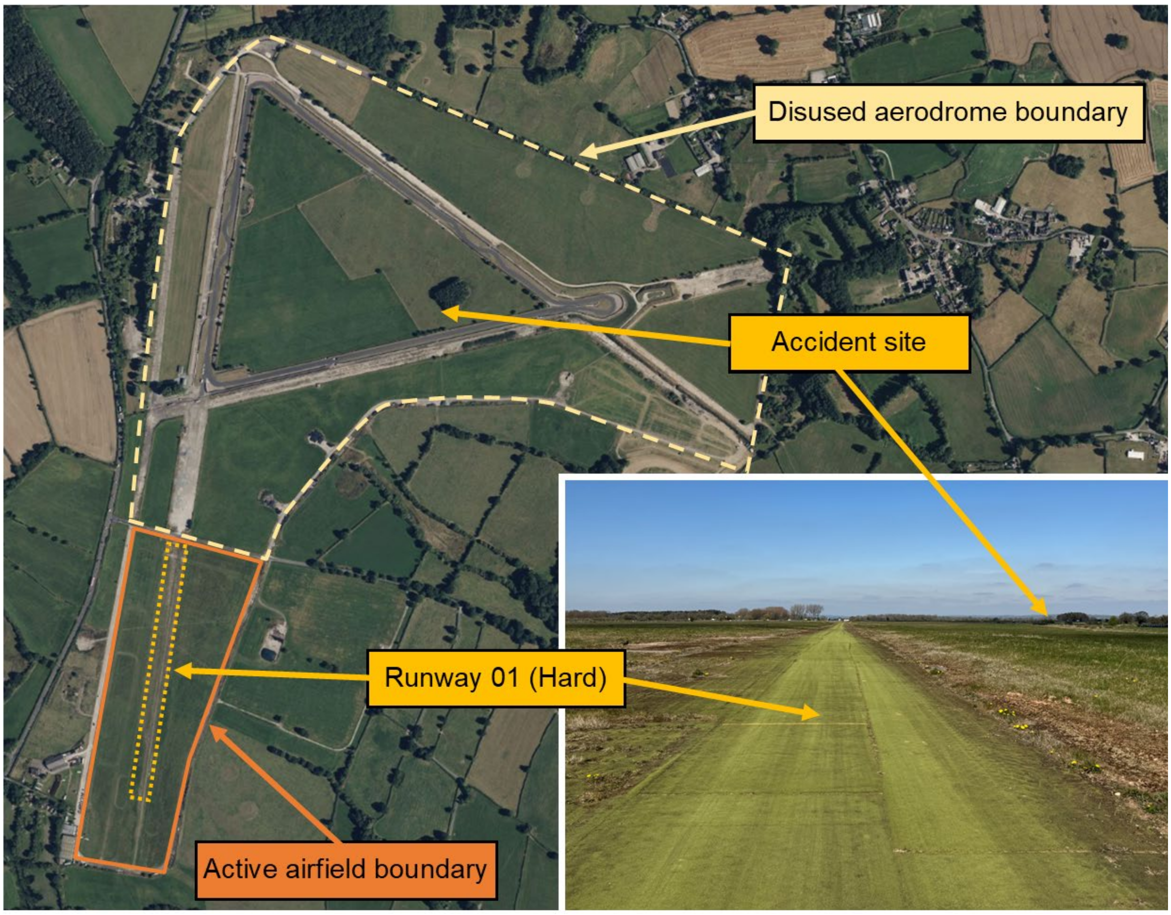

Figure 8

Overview of Darley Moor Airfield with inset view from threshold of Runway 01 (Hard)
(Satellite imagery ©Vexcel Imaging)

The active track of the racing circuit is bounded on both sides by barriers made from used vehicle tyres. These tyres form contiguous semi-solid structures which a pilot would ideally need to avoid during any forced landing attempt (Figure 9). Nonetheless, taking off in the Runway 01 direction there are several open grass areas within the bounds of the disused aerodrome suitable for emergency landings (Figure 10).

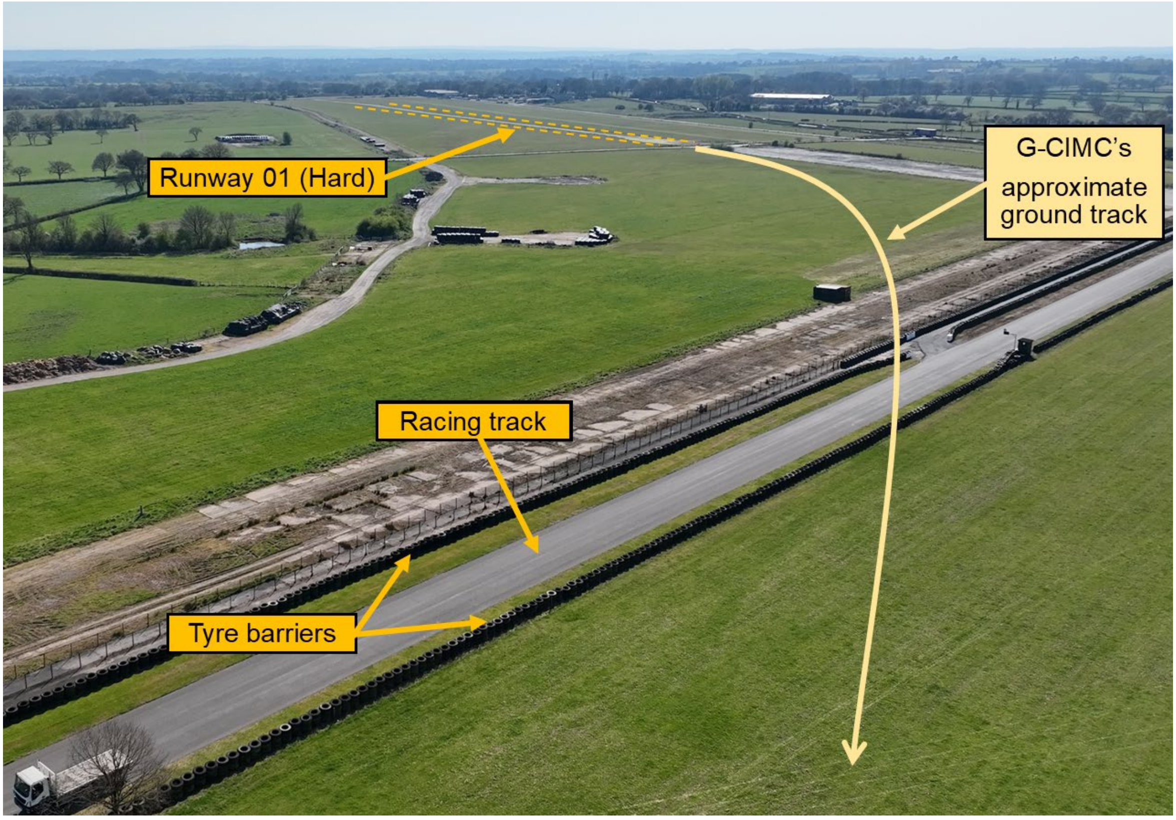

Figure 9

View towards airfield from above the accident site

Figure 10

View looking north-east past the accident site

Personnel

Pilot

The pilot was a former commercial airline pilot with over 17,000 flying hours experience. He was certified as a Flying Instructor (Aeroplanes) and had regularly instructed on light aircraft at a club near to Darley Moor. In August 2024, the pilot renewed his TMG class rating after it had been lapsed for several years. The investigation did not establish how many total TMG hours he had flown prior to that time. From August 2024 onwards he flew 12 hours 35 minutes in TMGs, 9 hours of those in G-CIMC. The operator stated the "pilot passed an assessment of his ability to conduct Introductory Flights at the Club" in January 2025. He did not receive any remuneration for flights conducted in G-CIMC.

The pilot's stature was approximately 175 cm (5 ft 9 in).

Passenger

The investigation was unable to find evidence the passenger had been asked to complete a health declaration before the flight at Darley Moor. The family member who purchased the flight for the passenger stated they were not aware of any medical or weight limitations.

The passenger's stature was approximately 187 cm (6 ft 1.4 in).

Postmortem findings

Neither of the occupants' postmortem examinations found evidence of medical factors that could potentially have been causal or contributory to the accident.

Organisational information

UK regulatory framework and guidance for introductory flights and trial lessons

The Air Operations Regulations (UK Reg No.965/2012)[10] for non-commercial operations (NCO)[11] includes a derogation for introductory flights to be flown in accordance with the operating rules for NCO flights subject to specific conditions. For ease of reference, those conditions are repeated in Civil Aviation Publication (CAP) 1653[12] '*Introductory Flights – Guidance to Operators,*' published by the CAA to provide guidance for organisations wishing to conduct introductory flights in the UK.

CAP 1653 defines the term introductory flight as:

> *'…any flight against remuneration or other valuable consideration consisting of an air tour of short duration, offered by an approved training organisation[13] or an organisation created with the aim of promoting aerial sport or leisure aviation, for the purpose of attracting new trainees or new members.'*

Footnote

10 Available at Air Operations [accessed 20 October 2025].
11 UK Reg No.965/2012 NCO.GEN.105 Pilot-in-command responsibilities and authority.
12 Available at CAP1653: Introductory Flights – Guidance to Operators | UK Civil Aviation Authority [accessed 18 September 2025].
13 Including Declared Training Organisations (DTO).

It further states that such flights are to be conducted:

> *'…on the condition that the aircraft is operated by the organisation on the basis of ownership or dry lease, that the flight does not generate profits distributed outside of the organisation, and that whenever non-members of the organisation are involved, such flights represent only a marginal activity of the organisation.'*

Organisations should inform potential passengers that introductory flights are not required to conform to the same safety regulations as commercial or public transport operations.

Selected additional CAP 1653 guidance is as follows:

- The aim of the introductory flight scheme is '*to attract new trainees or new members*.' They are not designed to replace any Light Aircraft Pilot's Licence or PPL syllabus flights, and the flight time cannot count as training towards the grant of a pilot's licence.
- Introductory flights '*should consist of an air tour of short duration*.'
- If the customer wishes to handle the controls of the aircraft, it must be booked as a trial lesson with an appropriately qualified instructor.

The operator and the pilot in command (PIC) are expected to assess the risk to the occupants of the aircraft by considering various factors, including '*aircraft weight and balance and performance calculations*.'

The Air Operations Regulations place specific responsibility on the PIC for the safe conduct of a flight, including compliance with airworthiness, WB and aircraft operating limitations detailed in the AFM and associated documentation. These regulations do not explicitly specify how a PIC should satisfy themselves that WB limits are observed. The CAA publication *'Safety Sense Leaflet 09 - Weight, Balance and Performance'*[14] provides guidance on the topic of weight, balance and aircraft performance for pilots conducting NCO flights. For the flight being undertaken, there was no regulatory requirement to generate an auditable record of WB calculations made by the pilot.

Flight training, including trial lessons which cover Exercises 1 to 4 of the syllabus for the issue of a Part-FCL licence, is conducted in accordance with Annex 1 (Part-FCL) of Aircrew Regulations (UK Reg No.1178/2011)[15].

Aircraft operator

While the operator held BGA Declared Training Organisation (DTO) status at the time of the accident, the nature of the flight was outside the scope of the BGA delegation, and, therefore, operated under the regulations for NCO flights.

Footnote

[14] Available at CAA Safety Sense Weight, Balance and Performance [accessed 14 November 2025].
[15] Available at Aircrew [accessed 20 October 2025].

The club sold introductory flights to the public through an online voucher scheme. The passenger's voucher was purchased directly from the club's website which described the flight as a first flying lesson which would include a 100 km *'motor glider tour'* of four lakes and four Second World War airfields in the local area. Flight vouchers could also be bought via a third-party 'experiences' company. The club explained that, while the flight was generically marketed as a trial lesson, the accident flight was being undertaken as an introductory flight rather than a flying lesson.

The '*Vouchers*' link on the club's website directed users to a page containing brief descriptions of each of the available flight packages with associated '*Buy Now*' buttons. The vouchers landing page did not contain information regarding age or medical restrictions and clicking the '*Buy Now*' button took customers directly to the payment platform. Nonetheless, the age and medical restrictions reproduced below could be found on the club's '*Terms and Conditions*' webpage which was accessible through an '*Airfield Info*' dropdown menu.

> *'…There is no upper age limit although in the interest of your own safety you must give details of any medical condition that may affect your ability in the air... The weight limit for tandem hang gliding, tandem paragliding and all microlight flights is 14.5 stone [92 kg]. Your weight should be in proportion to your height. If you fail to meet any of these requirements please call the office on [redacted] immediately.'*

These restrictions were largely reproduced on the fourth page of the electronic voucher emailed to the family member who booked the trial lesson, albeit the weight limit for glider flights was set at 90 kg.

The third-party experiences website quoted a weight limit of 14 stone [89 kg] and a maximum height of 6 ft 4 in for all flights. This information was accessible through a dropdown menu on the website rather than being included in the description of the experience being booked.

The flight vouchers included day membership of the club, and the operator explained that normal procedure was for students/passengers to complete a '*membership enrolment*' form before their first flight (Figure 11). The enrolment form requested personal details and contained various statements, in the form of a memorandum of understanding (MoU), for the applicant to initial. One of these statements was a medical declaration. The form did not capture passengers' weight, next of kin information or emergency contact details. The first MoU disclaimer had not been updated to include TMG flying. Prior to 8 April, the operator had only conducted two other introductory flights using G-CIMC, both were flown by the accident pilot on the preceding day. The club were unable to provide the investigation with a completed membership enrolment form for the accident flight passenger or for the other two voucher holders who flew in G-CIMC on 7 April 2025.

MEMBER DETAILS ***(please use block capitals)***			
First Name:		Surname:	
Contact Tel 1:		Contact Tel 2:	
E-mail:			
Address:			
		Postcode:	
Date Of Birth *(if under 18 Yrs)*:		Parent/ Guardian Name:	
Occupation	*Can you help the club?...*		
Where did you hear about us?:			

MEMBERSHIP TYPE ***(office use only)***		
DAY	PG TANDEM	( )
	PG DAY TASTER	( )
	HG TANDEM	( )
	ML AIR EXPERIENCE	( )
	PILOT	( )
MONTHLY	SOCIAL	( )
	GLIDING	( )
	POWER	( )
	GOLD	( )
	ANNUAL	( )

MEMORANDUM OF UNDERSTANDING ***(initials)***	
• I fully appreciate that Hang-gliding, Paragliding, Microlighting and Foot Launched Powered Aircraft are potentially hazardous sports and in that knowledge I accept the risk that I could suffer personal injury or damage as a result of taking part in these sports.	___
• I also understand that I have no right to claim compensation from [redacted] its representatives, or instructors, in respect of any such accident causing damage or personal injury to me. This does not affect my statutory rights.	___
• I confirm that I have declared any mental, or physical condition, past or present, which may render me unfit to participate in the activity I am about to undertake and that I have also declared all medication I am receiving.	___
• I understand that it is a mandatory requirement for ALL students/ pilots undertaking flying activities from Darley Moor Airfield to hold third party insurance cover. I have discussed insurance options with my instructor and am aware that no provision for personal accident insurance may be available for specified disciplines.	___
• **I confirm that I have read and agree to abide by the [redacted] 'Airside Safety Rules'** ***(see reverse)***	___
• I accept that if I act at any time in a manner that endangers my safety, or that of others, I will be indefinitely stopped from flying at Darley Moor Airfield.	___
• I accept that the Chief Flying Instructor's decision is final and binding in all matters relating to flying and airside conduct.	___

I have read, understood and initialled the Memorandum of Understanding and agree to abide by the Airside Safety Rules			
Signature of Applicant ***(Parent/ Guardian if under 18 Yrs)*:**		**Date:**	

Figure 11

Gliding club membership enrolment form

Assessment of the risk of obscuration, obstruction or inadvertent control movement

A basic assessment of the potential for visual obscuration, obstruction or inadvertent operation of any control relevant to the takeoff was conducted using an exemplar aircraft and two males of a similar stature and weight to the aircraft occupants. The person simulating the passenger was 188 cm tall and weighed 112.6 kg. The person simulating the pilot was 177 cm tall and weighed 79.5 kg.

The physical match between the aircraft occupants and the males taking part in the assessment in terms of other body dimensions such as individual limb lengths and circumferences was not determined.

The aircraft seat position could not be adjusted. The pedal position was adjustable and both participants in the assessment adjusted their pedals to the best position for their size within the aircraft's limitations which was fully forward for the left seat (simulating the passenger).

No instruments, switches or controls on the main cockpit panels were visually or physically obscured including the propeller pitch control, rpm indicator, air speed indicator and the choke (Figure 12).

When the participants were seated in a relaxed posture, all controls on the lower centre console were fully or partially visually obscured and the controls on the left side of the centre console were partially physically obstructed by the right leg of the person in the left seat. Moving their right leg to the left to avoid obstructing these controls, resulted in fouling of the control column.

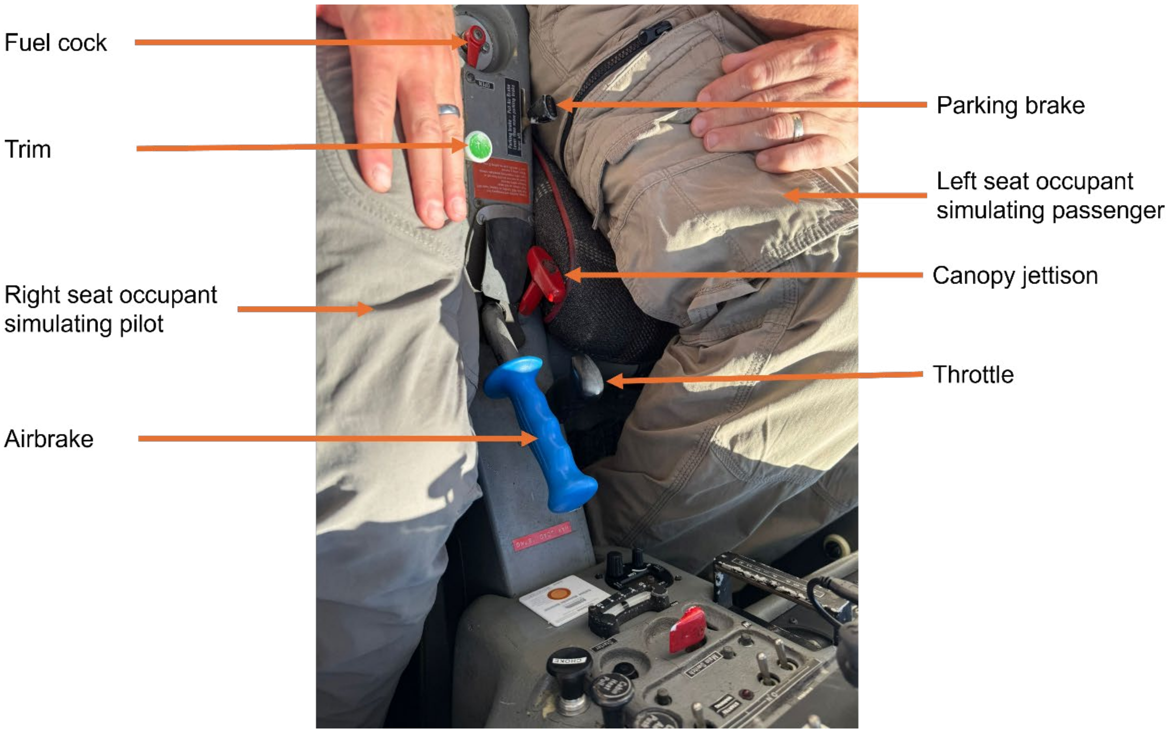

Figure 12

Position of controls on the centre console (picture taken from above instrument panel looking towards the rear of the aircraft)

In particular, the throttle control was positioned in the crook of the left seat occupant's knee and inadvertent movement was possible, for example if moving the legs to avoid obstructing the rudder pedals (Figure 13). The airbrake control was not obstructed or at risk of inadvertent operation due to its length and direction of movement.

Figure 13
Obstruction of controls on the centre console

The design of the trim lever meant that if the aircraft was trimmed nose-down and the lever was knocked out of the detent when the control column was being pulled aft beyond the trimmed position, it would suddenly jump to a new more nose-up position. Inadvertent trim lever movement of this kind was possible but not likely, unless the right seat occupant had items in a left thigh pocket. The accident pilot's clothing did not have any thigh pockets.

Analysis

Technical aspects

Examination of the aircraft wreckage did not identify a technical defect that could have either caused or contributed to the loss of control or an uncommanded reduction of engine power. The aircraft's engine was producing sufficient power during the takeoff roll, with the recorded propeller rpm greater than 2,700, the minimum required for takeoff. While it was not possible to determine the propeller blade pitch setting at impact, the recorded takeoff rpm is only achievable with the propeller set to fine pitch, as required by the AFM.

Accident flight

A family member had used the club's online voucher system to purchase the flight as a gift for the passenger and was unaware of any applicable weight or medical limitations. Although marketed as a trial lesson and with the PIC occupying the right seat, the club categorised the flight being undertaken as an introductory flight subject to UK Air Operations NCO regulations. Pilots occupying the right seat need to fly with their right hand, operate throttle and airbrake with their left hand, and look across the cockpit to read the primary flight instruments which are in front of the left seat occupant. The accident pilot was familiar with flying G-CIMC from either seat.

Witnesses described the takeoff as proceeding normally until the aircraft reached approximately 50-100 ft, at which point it started “wallowing.” These pitch oscillations were suggestive of an aircraft close to the aerodynamic stall during the final few seconds before it departed from controlled flight. By the time the aircraft was in obvious difficulty it was out of earshot to the witnesses, none of whom reported hearing anything untoward related to the engine. The investigation was unable to determine why the aircraft appears to have been flying slower than expected, seemingly unable to climb or accelerate. The observed lack of performance is corroborated by the data traces in Figure 2.

The aircraft briefly achieved a maximum groundspeed of approximately 48 kt at 10:22:20 hrs before this reduced and remained below 44 kt from 10:22:26 hrs onwards. At one point the groundspeed reached as low as 30 kt. The LFMS performance expectation for the Dimona’s average rate of climb from liftoff to 300 m was 2.7 m/s. G-CIMC’s initial rate of climb for 10 seconds after lift off averaged approximately 2.14 m/s. The rate of climb then further reduced for 20 seconds as the groundspeed plateaued. It then increased to approximately 2.8 m/s as the groundspeed reduced toward 30 kt, after which the aircraft descended for the remainder of the flight.

While the investigation did not find a recording of the local surface wind, it was likely from an easterly direction at less than 10 kt, with little or no speed variation between the surface and 200 ft. With a wind speed at or below 10 kt, even if heading directly into wind, the aircraft was close to or below its clean, power-off stalling speed leading up to the point when the right wing dropped. The AFM did not give a figure for the power-on stalling speed, but the described symptoms were similar to the observed behaviour of G-CIMC.

Unable to climb and being close to the stall, an option open to the pilot should have been to commit to a forced landing. There were several grassed areas close to the accident site where an immediate landing might have been possible. In considering why the pilot was unable to execute an emergency landing, the investigation considered the right yaw experienced after lift off could have left the aircraft pointing between fields in the centre of the racetrack and a longer field east of the circuit. Turning left to land on a northerly heading might have risked colliding with the tyre barriers bordering the track. Turning right would have aligned the aircraft with a suitable landing area east of the circuit if the pilot had been able to fly beyond the tyre barriers. Tragically, the aircraft departed from controlled flight before a safe approach path could be established in either direction.

Neither of the occupants’ postmortem examinations found evidence of medical factors that could potentially have been causal or contributory to the accident, but not all acute medical changes are pathologically detectable. Therefore, the investigation could not confirm or discount medical incapacitation as a possible causal or contributory factor. There was no evidence that the passenger or pilot were at any greater risk of incapacitation that any other pilot and passenger for this type of flight.

A basic assessment of the fit of similarly sized occupants in the aircraft showed that it may have been difficult for the passenger in the left seat to avoid fouling some of the controls. Visual obscuration of any relevant instruments was unlikely to be contributory. Inadvertent operation of the airbrakes, choke or propellor pitch controls was unlikely due to their design and position in the cockpit. Inadvertent movement of the throttle by the passenger's leg was identified as a possibility. Inadvertent movement of the control column by the passenger, for example when attempting to avoid the throttle, was considered unlikely because this would result in left roll which was not witnessed during the accident. Inadvertent movement of the trim by the pilot's left leg was possible but is not likely because there were no thigh pockets whose contents could push against it. *'CAA Safety Sense Leaflet 02 - Care of Passengers'*[16] contains guidance for the management of passenger safety and includes reference to the potential for control obstruction.

Personnel

The pilot was appropriately licensed and held a valid medical certificate for the flight to be undertaken. He was in recent flying practice, familiar with G-CIMC and had flown it twice the previous day. He was reported to be in good spirits and looking forward to flying on the day of the accident.

Flight documentation

Although the club was unable to provide the investigation with completed membership enrolment forms for any of the three trial flights flown in G-CIMC, day membership was included in the cost of the flight voucher. The enrolment forms did not require pilots or passengers to declare their weight, nor did they include space to record next of kin or emergency contact details.

While the pilot had been observed preparing the aircraft in the hour before the passenger arrived, the DI book was not signed before the flight.

The flight was not conducted under its DTO delegation however, the BGA elected to take the following safety action:

The British Gliding Association wrote to all its member clubs:

- Highlighting where relevant guidance for the oversight of introductory flights can be found.
- Stressing the importance of ensuring flight preparation, including mandatory documentation, is completed fully and without distraction before flight.
- Asking them to consider the potential for 'duty teams' to feel under pressure when environmental conditions or the suitability of a passenger for the intended flight may pose a heightened risk to the operation.

Footnote

16 Available at Safety Sense 02 Care of Passengers [accessed 14 November 2025].

Weight and balance

The aircraft took off above its maximum allowable takeoff weight and the passenger's mass exceeded the weight limit for the aircraft seat. Even working to the incorrect limit of 184 kg, G-CIMC's limited available payload was a risk factor for the operation, one requiring proactive management to ensure compliance with AFM limits. The investigation considered four potential barriers which might reasonably have prevented the overload condition from occurring. Some were not present, others were breached.

- Barrier 1: booking system weight limit information – Present/Breached.

The online booking platforms for both the club and the experiences company specified boarding weight limits but enabled and/or allowed customers to pay for flights before being presented with that information. Explicitly alerting customers to the limit before they proceed to payment and requiring customers to declare their boarding weight as part of the checkout process would ensure appropriate visibility for customer and operator. Body weight is a potentially embarrassing topic for people. Informing customers that an accurate boarding weight declaration was required for safety purposes and that it would be checked at the airfield before flight could avoid awkwardness at the Barrier 3 stage below.

- Barrier 2: voucher wording – Present/Breached.

While the terms and conditions listed on the voucher sent by the club included the weight limit of 90 kg, this was on the last page of the document in a general paragraph on age and medical restrictions. Many customers do not read terms and conditions in their entirety. Placing safety critical conditions at the start of such documents would make them more likely to be noticed.

- Barrier 3: formal weighing of new pilots and passengers – Not present.

While the club possessed a set of scales for the sole purpose of weighing pilots and passengers, its use was ad hoc rather than formalised. Requiring accurate boarding weights to be measured as part of the membership enrolment process would remove the element of subjectivity employed at the time of the accident flight.

- Barrier 4: mandatory WB paperwork – Not present.

In conjunction with Barrier 3, requiring PICs to formally calculate and record WB for initial flights would have acted as a barrier by highlighting the aircraft seat and weight limit exceedances from the outset. Even with pilots who meet the 90 kg limit, the payload limit could easily be exceeded if the maximum available fuel load is not calculated using accurate boarding weights. For this reason, WB calculations should be carried out during the planning stage, and before refuelling takes place. For pilots who regularly fly together, provided one auditable WB calculation is on record, an ongoing requirement for every flight would be potentially nugatory although body mass changes over time would need to be taken into consideration.

With all four of these potential barriers bypassed, the operation was unaware the combined weight of the occupants alone was too heavy for the intended flight. The investigation did not find evidence of what pre-flight planning or WB calculations might have been conducted by the pilot and no completed pre-flight documentation was discovered. The passenger was with the club officer when the pilot met him, so it is possible the pilot assumed pre-flight documentation had already been completed.

While not considered causal, the aircraft being overweight could have been an exacerbating factor when the aircraft was operating at the edge of its flight envelope, close to the stall. Extrapolation beyond an aircraft's CG envelope falls outside certification criteria, but the investigation considered it reasonable to conclude the longitudinal CG position of G-CIMC was unlikely to have been a causal factor.

Following this accident the club has taken the following safety actions to ensure pre-flight data capture, including customers' boarding weights, is completed before any experience flight can be scheduled:

The operating club has:

- Amended its flight booking processes to require the completion of an online data capture and flight waiver form by customers before any flight experience is scheduled.
- Instigated a requirement that declared boarding weights are verified at the airfield before a passenger's first flight.

Incorrect calculation of the maximum payload

The aircraft's weight and balance report incorrectly identified the maximum payload because the limitation on maximum weight of non-lifting parts was overlooked. The maximum payload was recorded as 184 kg; the correct figure was 170.6 kg. As a result of this accident the BGA plans to issue a notice to all BGA Inspectors highlighting the need to identify all relevant information, including a non-lifting parts limitation, when producing aircraft weighing reports for aircraft maintained within the BGA CAO.

Conclusion

The accident occurred because the aircraft was unable to maintain a safe climb profile after takeoff. The investigation was unable to determine why the aircraft did not climb as expected or what factors contributed to the pilot not being able to carry out a successful forced landing. The engineering investigation did not find evidence of any technical issue that might have limited engine performance. An anthropometric study found the potential for fouling of the controls meant that an inadvertent throttle reduction was a possibility and that inadvertent movement of the trim was possible but not likely.

While the aircraft took off approximately 35 kg above the maximum approved mass, the investigation considered that to be a contributory rather than causal factor.

Safety actions

The British Gliding Association took the following safety action:

The British Gliding Association wrote to all its member clubs:

- Highlighting where relevant guidance for the oversight of introductory flights can be found.
- Stressing the importance of ensuring flight preparation, including mandatory documentation, is completed fully and without distraction before flight.
- Asking them to consider the potential for duty teams to feel under pressure when environmental conditions or the suitability of a passenger for the intended flight may pose a heightened risk to the operation.

The following safety actions have been taken by the operating club:

The operating club has:

- Amended its flight booking processes to require the completion of an online data capture and flight waiver form by customers before any flight experience is scheduled.
- Instigated a requirement that declared boarding weights are verified at the airfield before a passenger's first flight.

Published: 2 April 2026.

Accident

Aircraft Type and Registration:	Cagatay CGT-50
No & Type of Engines:	1 two-stroke DA100 piston engine 4 electric motors
Year of Manufacture:	(Serial no: 569)
Date & Time (UTC):	5 October 2023 at 1115 hrs
Location:	Radnor Range, Powys
Type of Flight:	Demonstration flight
Persons on Board:	Crew - None Passengers - None
Injuries:	Crew - N/A Passengers - N/A
Nature of Damage:	Destroyed
Commander's Licence:	Other
Commander's Age:	29 years
Commander's Flying Experience:	83 hours (of which 2 were on type) Last 90 days - 7 hours Last 28 days - 4 hours
Information Source:	AAIB Field Investigation

Synopsis

While conducting a demonstration flight at Radnor Range the right wing separated from the unmanned aircraft. The remainder of the aircraft descended rapidly, out of control and struck the ground close to personnel who were standing under the flight path.

The investigation found that the wing assembly on the accident aircraft did not have sufficient structural strength to carry the wing bending loads encountered in 1 g straight and level flight. Structural components known as wing joiners, which attached the wings to the fuselage, were shorter than the design specification. Together with a wing design that allowed movement of the joiner position and an absence of procedures to ensure the wing joiners were installed symmetrically during aircraft assembly, this created a condition where there was an uneven bending load distribution on the forward wing joiner.

The investigation determined that it was likely that old stock wing joiners from an earlier aircraft development model were inadvertently fitted to the aircraft at the production facility.

The UAS was operating in the specific category under a CAA operational authorisation (OA). The CGT-50 was not designed, built or tested to any recognised standards, nor was it required to be for operation in the specific category.

The manufacturer took several safety actions to improve quality and component control in its production facility. These included introducing dimensional tolerances on design

drawings, introducing quality checks on supplied components, introducing serial numbers for wing joiners, modifying the design and production process and introducing wing joiner assembly procedures.

The range reviewed its safety plan and indicated its intention to make several improvements to operational communication and hazard management.

History of the flight

The aircraft was being flown during a week-long event, demonstrating unmanned technologies at Radnor Range[1] (the range). Its planned flight the day before the accident was cancelled for weather reasons.

The aircraft's technicians performed its assembly and pre-flight checklists normally. Loaded to its MTOW of 55 kg, the aircraft was started at 1114 hrs, facing into a reported headwind for the route of 12-13 kt. It took off vertically then transitioned to a forward climb. Around twelve seconds later the right wing detached. The aircraft descended rapidly, striking the ground near some pyrotechnic operatives who were standing under the flight path (Figure 1).

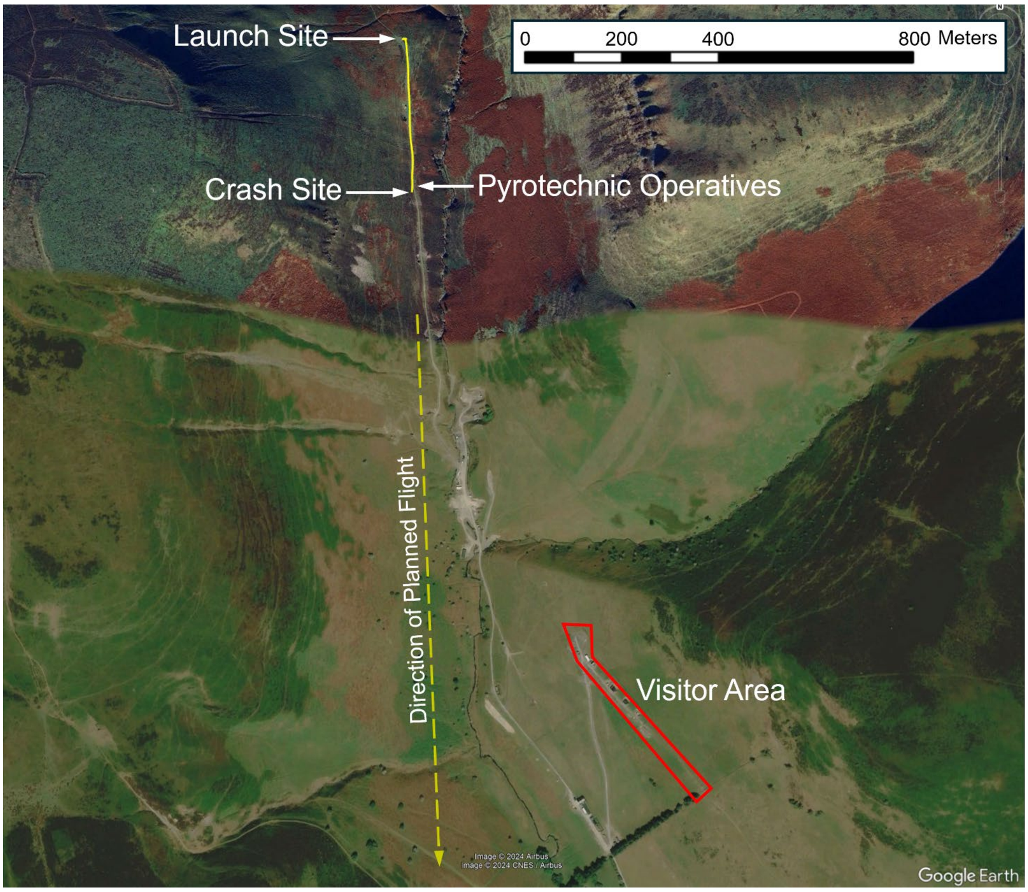

Figure 1

Overview of flight path and location of pyrotechnic operatives and visitor area

Footnote

1 A civilian small arms range.

Background to the operation

The CGT-50 UA was designed, manufactured, operated and distributed by a single organisation, based in Ireland, which for simplicity, will be referred to in this report as the operator. Much of the composite airframe manufacturing and component integration was carried out under sub-contract at a separate, but closely linked, production facility in Turkey. This was done using build-to-design documentation and instructions, as well as avionic systems and software provided by the operator.

Civil Aviation Publication (CAP) 722[2] *'Unmanned aircraft system operations in UK airspace – Policy and Guidance'* outlines policy and guidance in relation to the operation of UAS. It describes that UAS operations are regulated in a manner that is proportionate to the level of risk that the individual operation presents, with UAS operations falling into one of three categories, open, specific and certified.

The CGT-50 operation was being conducted under the specific category, a key element of which is that the UAS operator is required to hold an OA, issued by the CAA. CAP 722[34] *'Unmanned Aircraft System Operations in UK Airspace – Operating Safety Cases'* outlined the process that an applicant should follow to complete a safety assessment as part of the application process for an OA. This required submitting an operational safety case (OSC) for the proposed operation. The CAA would evaluate the OSC to determine if the operator's risk assessment was valid, and if satisfied, issue an OA. The OA document sets out the conditions and limitations of the operation.

The OA for this operation was issued by the CAA on 7 September 2023. The operator submitted an OSC, structured over three volumes[5], as part of the application process. The operator's OSC was prepared for the sole purpose of the demonstration flight at Radnor Range in October 2023, and the OA was valid only for this operation.

Operational authorisation documentation

Introduction

The operator's OSC for this operation was aligned with the range's safety plan and related documentation. The OA specified that *'Flights **must not** be carried out within **50 m**[6] of uninvolved persons...* [or] *assemblies of people.'*

Footnote

2 Ninth edition amendment 1 dated December 2022 was extant at the time of the accident and at the time of the operator's application for an OA.
3 Second edition dated December 2022 was extant at the time of the operator's application for an OA.
4 From 23 April 2025, CAP 722A was withdrawn and UK SORA (Specific Operations Risk Assessment) replaced the CAP 722A OSC risk assessment method.
5 Volume1: Operations manual; Volume 2: Systems; Volume 3: Safety risk assessment.
6 Reduced to 30 m during takeoff and landing.

Information from the OSC

The flight team

The OSC Volume 1 explained that a flight team is led by a *'Flight supervisor'*, who is responsible for operational communications during the flight. They decide from the operator's perspective *'…whether or not a flight can… proceed'*. They maintain *'live oversight of actual flight operations'*.

The *'Remote pilot'* (RP) is responsible *'for the overall safe conduct of the flight'*, ensuring any *'previously unidentified risks… are assessed and that appropriate actions are implemented'*. The RP is supported by a *'Visual observer/technician'* and *'Deployed airspace observers'*, who maintain situation awareness of the UA and alert hazards to the RP.

Operating guidance

The OSC Volume 1 included the following operating information:

> *'Remote pilots and accountable manager[7] will attend the flight briefings[8] from Range Control… The UAS is equipped with an FPV[9] camera which may be used to provide additional situational awareness during flight… For BVLOS VM[10] operations, 2 UHF radios and 2 cell phones[11] will be available to flight crew at all times… the first coordination will be made through Range Control for flight... Due to the nature of the site and demonstration, all personnel on-site are deemed as involved persons and will attend a safety briefing in advance of the planned flights at Radnor Range. All personnel outwith the flight crew and deployed airspace observers will be located within the designated "Visitor Area"...*
>
> *On completion of the pre-flight preparation the Supervisor[12] will contact range control to confirm permission to fly and ascertain an update on any planned movements. The Supervisor will then evaluate whether the operation can proceed and communicate the decision and any requirements or restrictions to the flight team. Supervisor will also liaise with ATC confirming the launch of the UAS…'*

Safety risk assessment

The OSC Volume 3 stated the *'Risk of harming uninvolved persons and third party aircraft is minimised and controlled'* and *'Ground crew informed about take-off and landing timing'*. The *'operation is taking place over a controlled ground area and within a NOTAM… and safety distances are maintained with ground personnel… with visual observers… to keep the UA within line of sight at all times'.*

Footnote

[7] Operator's CEO.
[8] Refers to 'Safety briefing' in Radnor safety plan section.
[9] First person view.
[10] Beyond visual line of sight with visual mitigation.
[11] The flight crew and deployed airspace observers use these to communicate.
[12] Flight supervisor.

Radnor range safety plan

The *'Radnor range safety plan'* explained the event would be overseen by the Radnor safety officer (RSO). The RSO would *'Ensure that all personnel are made aware of the control measures identified in the Activity Risk Assessments*[13] *and that they are applied… Deliver a safety brief… to all personnel at the start of the activity… Ensure the whereabouts of all personnel is always known… Intervene if a breach of safety is about to occur'.*

Information from the range

The range operations director (ROD) explained the pyrotechnic operatives were scheduled to be present in the operating area until 1300 hrs (Figure 1), when the accident flight was due to commence. However, the flight was brought forward because of an earlier weather window, meaning they were still near the planned flight path when the flight occurred. Although the flight team made a radio call before taking off, both the ROD and the operator's RP commented that radio communication between them was somewhat unclear. The pyrotechnic operatives were visible on the aircraft's FPV camera (Figure 2). They had radio contact with the range, but not with the flight team.

Figure 2

View from fin-mounted FPV camera showing location of pyrotechnic operatives

As a result of this accident, the range reviewed its safety plan and intends to make the following improvements: ensure robust radio communications between all parties on the range; ensure that a range employee accounts for the location of every person on the range before takeoff is permitted; introduce standard phraseology for takeoff permission and a

Footnote

[13] Contained in OSC Volume 3.

"stop stop stop" call for use by anyone on the range who identifies a hazard; and advise range employees to "stop and think" about the ramifications of a schedule change before continuing to operate.

Additional information from the operator

The RP reported that, with the visitor area on the valley's east side, the UA's flight was planned to hug the valley's west side, parallel to the road. The flight team were aware of people on the road, but not that they would be under the flight path.

The RP reported believing the operator had learned from the event, for example, being mindful of the extent to which external pressures might affect an operation.

Recorded information

Data from the aircraft was recorded by the ground control station (GCS) at 1 Hz and a subset of this data in cloud storage at 5 Hz. The data included GPS position, inertial speed and acceleration, attitude, engine, battery, aircraft status and warning. A forward-looking camera mounted on the fin of the aircraft streamed video to the GCS (where it was recorded).

Accident flight

Figure 3 shows the flight path of the aircraft. The duration of the flight was about 40 seconds covering a distance of 340 m. Over the first 16 seconds, the aircraft climbed 60 ft vertically, before transitioning into forward climbing flight. As the aircraft accelerated through 53 KTAS (42 kt groundspeed), the video recording showed the right wing bending upwards at the root. At this point the aircraft was at 235 ft agl, having climbed a total of about 174 ft. It then began to tumble and descend to the ground at about 60 kt during which the right wing detached.

Video footage taken by one of the pyrotechnic operatives shows the aircraft overhead just as the wing failed.

The video images are consistent with the aircraft nominally in 1 g flight conditions ie wings level and no indication of buffet when the wing failed. Acceleration data from the aircraft's attitude and heading reference system (*AHRS*) was only recorded at the GCS (at 1 Hz) and not in the cloud storage. These 1 Hz samples were unlikely to have recorded any spikes in the acceleration data given such spikes happen over a fraction of a second with an instantaneous peak.

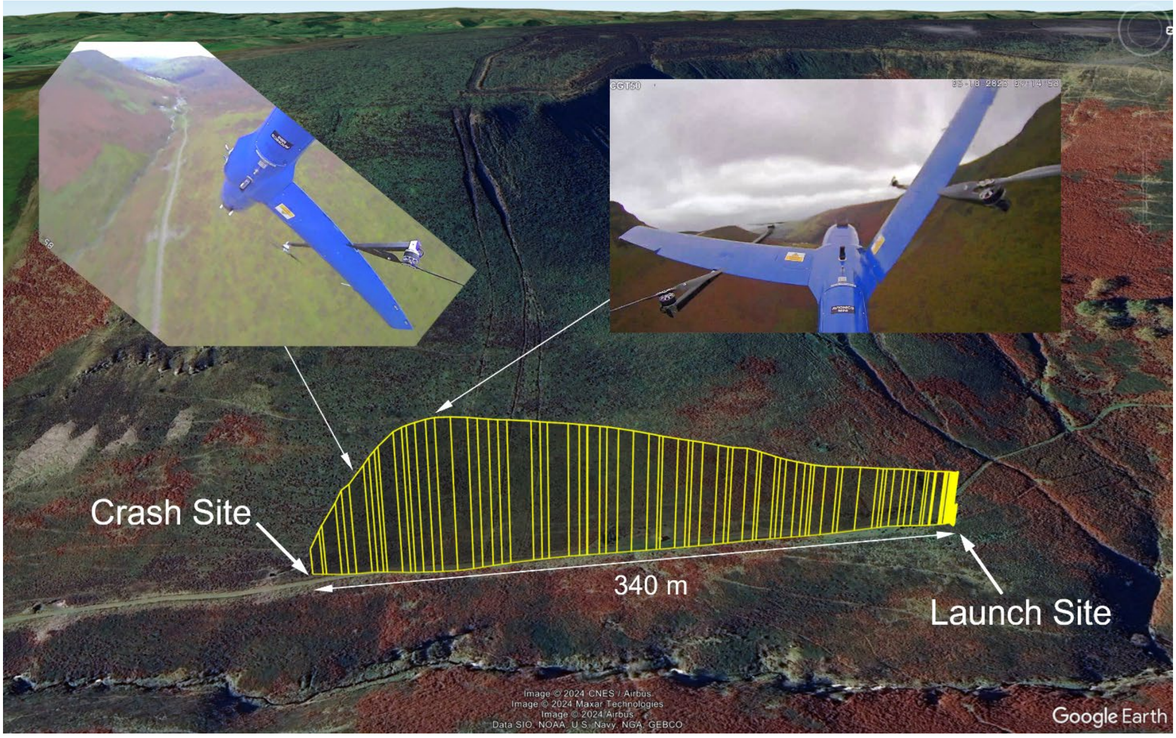

Figure 3

Flight path of the aircraft showing the view from the fin-mounted FPV camera when the wing failed and two seconds later as the aircraft tumbled towards the ground

The aircraft came to rest over 100 m further down the valley from the pyrotechnic operatives, close to the track.

Description of aircraft

General

The CGT-50 (Figure 4) is a fixed-wing, vertical takeoff and landing (VTOL) UA, with a T-tail configuration and landing skids located at the front. It is equipped with a primary two-stroke gasoline engine which provides power for forward flight and four electric motors for VTOL. The electric motors, powered by four lithium polymer batteries, are mounted on carbon fibre booms, fixed to the wing during aircraft assembly.

The CGT-50 has a maximum all-up weight of 55 kg, including provision for 5 kg payload. It has a maximum endurance of six hours and can operate to a maximum altitude of 18,000 ft.

Figure 4
CGT-50

Pre-flight wing assembly

The aircraft is stored and transported in a dedicated transportation box and is assembled on its launch table prior to flight.

A forward and an aft wing joiner are inserted through fixed joiner guides in the centre fuselage (Figure 5) and each wing, in turn, is fed on to the wing joiners, which slot into fixed joiner guides (hollow tubes) within the wing. Each wing joiner guide is fitted with an end cap at its outboard end. Mechanical connection of the wing is achieved via two fixed bolts at the fuselage-wing joint, with access to secure the nuts gained via the battery compartment in each wing. The VTOL booms are then attached to the underside of each wing and various services are connected.

Section 1.7 of the CGT-50 user manual[14] describes the steps required to assemble the aircraft accompanied by photographs. These are also described in the CGT-50 assembly checklist. At the time of the accident, neither the user manual nor assembly checklist included any instructions to require the wing joiners to be centralised on the fuselage, so that an equal joiner length was inserted in each wing.

Footnote

[14] Revision B, dated October 2022.

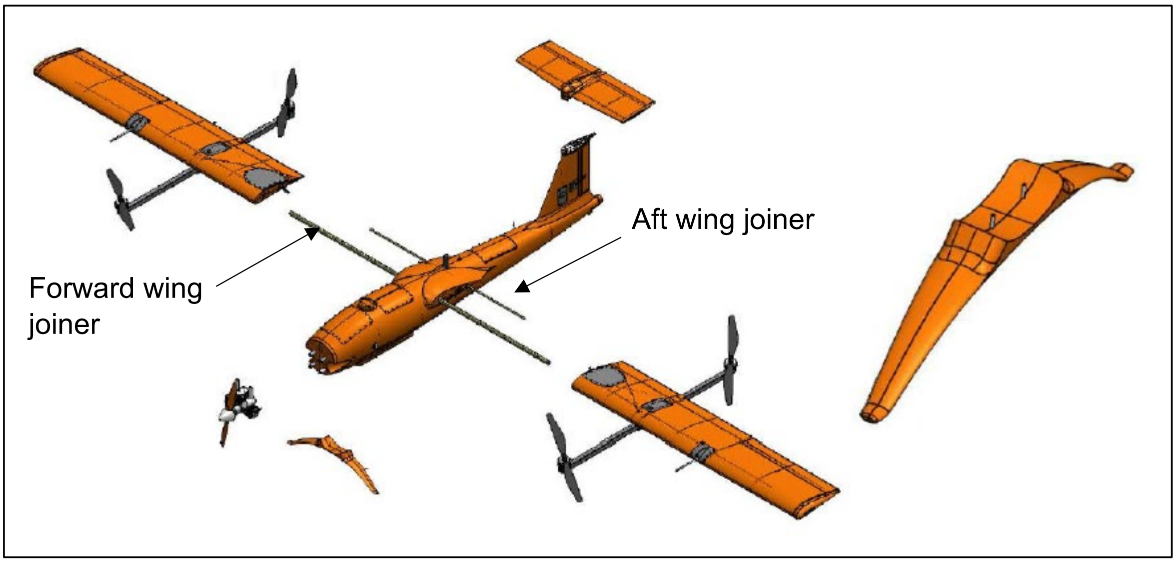

Figure 5
CGT-50 general arrangement

Wing structure

The CGT-50 wing and fuselage structure are constructed primarily from carbon fibre reinforced polymer composite (CFRP), with glass fibre polymer composite (GFRP) used in selected locations, including the wing root ribs and wing attachment point on the centre fuselage.

Two thin-walled, cylindrical, CFRP tubes, known as wing joiners, act as wing spars, reacting wing bending loads and transferring these into the fuselage.

Aircraft manufacturing

The CGT-50 software, electronics and airframe are designed by the operator. Manufacture of electronic components and composites materials are outsourced to suppliers.

The CGT-50 fuselage and wings are fabricated at the operator's production facility using a multi-step composite manufacturing process, which relies predominantly on manual lay-up and closed-moulding processes.

Aircraft history

Aircraft 569 arrived at the operator's facility in Ireland in August 2023, from its production facility in Turkey, prior to which it had completed a single flight of 16 minutes duration in January 2023. Three short hover-test flights and three training flights were performed by the operator's RPs between 4 and 21 September 2023, with no anomalies noted. At the time of the accident, the aircraft had accumulated a total flight time of 1 hour and 40 minutes.

Aircraft examination

Following the accident, the aircraft wreckage was photographed in situ by the operator's personnel before being loaded into the aircraft's transportation box and transported to its facility in Ireland. The wreckage was examined by the AAIB at the operator's facility several days after the accident.

The wings and empennage were relatively intact; the fuselage was heavily fragmented.

Examination of the right wing and wing-to-fuselage connection revealed that the reinforced root rib had been pulled out of the wing structure and had experienced an intra-ply failure. The forward third of the root rib remained loosely attached to the right wing, while the remaining portion of the root rib, along with the inboard wing root skin, remained attached to the fuselage by the wing attachment bolts (Figure 6).

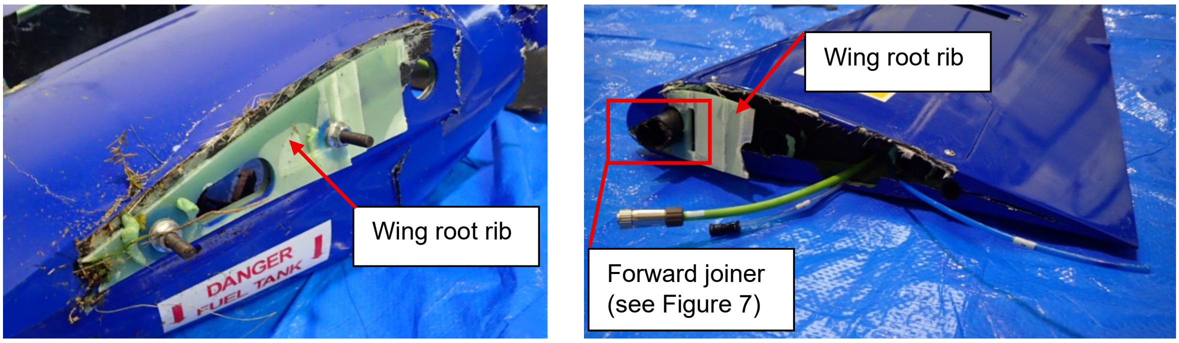

Figure 6

Right wing-to fuselage attachment interface and large portion of wing root rib (left image) and right wing root with remaining small portion of wing root rib attached (right image)

The forward and rear single-piece wing joiners had each broken into three parts, with a segment remaining installed in each wing and a central portion remaining within the fuselage. The fracture face of the forward joiner portion remaining in the right wing, which can be seen in Figure 6, is shown in more detail in Figure 7.

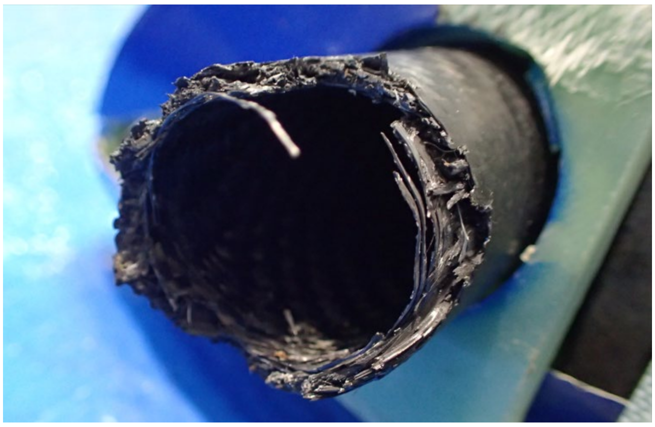

Figure 7

Fracture face of right wing forward wing joiner

Each joiner segment was removed and measured, as was the internal length of the joiner guide tube in each wing. The intact wing joiners from sister aircraft 570 were also measured for comparison. The results are summarised in Table 1.

Joiner	Left wing portion (cm)	Fuselage portion (cm)	Right wing portion (cm)	Total length (cm)
569 Forward joiner	82	36	108	226
569 Rear joiner	59	38.5	55	152.5
569 Forward joiner guide tube	116	39	107	262
569 Rear joiner guide tube	58.5	38.5	58.5	155.5
570 Forward joiner	N/A			224
570 Rear joiner	N/A			141

Table 1

Wing joiner measurements from Aircraft 569 and Aircraft 570

It was evident from these measurements that when aircraft 569 had been assembled prior to the accident flight, the forward and rear joiners had not been centralised on the fuselage to allow for symmetrical joiner insertion in each wing.

The forward joiner on aircraft 569 was 2.0 cm longer than that from the sister aircraft 570, and the rear joiner was 14.5 cm longer.

Internal measurement of the forward joiner guides on the accident aircraft identified that a wing joiner could be inserted 116 cm into the left wing, but only 107 cm into the right wing. It was noted that the end cap was missing from the outboard end of the forward joiner guide in the left wing. The absence of the end cap meant that it would be possible for the forward joiner to be installed further into the left wing than intended, such that it could protrude beyond the end of the joiner guide, until it reached the next internal rib. Despite this possibility, the as-found installation of the forward wing joiner was more biased towards the right wing.

The operator stated that the total length of the joiner guides was designed to be slightly longer than the joiners and that the exact positioning of the joiners within the guides was not critical. It did not consider joiner end caps to be essential items.

The operator reported that it had found the end cap dislodged from the forward joiner after the aircraft had arrived at its facility. The loose end cap was removed from the wing prior to the accident flight but subsequently could not be located by the operator following the accident and was therefore not available for examination.

Visual examination of the outboard end of the left wing forward joiner guide, where the end cap should have been fitted, showed that adhesive was present on only half of the circumference and the surface condition was not conducive to achieving a strong bond.

Detailed component examination

The fracture faces from the left and right wing segments of the failed joiners and the wing-to-fuselage attachment points, were subject to detailed examination at a materials failure laboratory to determine the failure modes.

Optical microscopy

Cross-sections of the two wing joiners were examined in an optical microscope. It was noted that sections from the rear joiner were more resin-rich with a relatively low fibre content and exhibited increased porosity compared to those from the forward joiner. The forward joiners had an approximate average wall thickness of 2.5 mm, while that of the rear joiners was approximately 1.0 mm but there was some variation along their length.

Fractography

The fracture faces of the failed joiners were examined using a scanning electron microscope (SEM). The architecture of the fibres was primarily woven and unidirectional plies were observed with the lay-up. The fractured fibres showed evidence of overload failure in tension and compression; some fibre ends displayed radial markings consistent with static tensile fracture, while other fibres exhibited microbuckling caused by static compression fracture. In general, the tensile fractures were present on the lower surface and compressive fractures on the upper surface. This was consistent with flexural failure of the joiners due to upwards wing bending.

SEM examination of the resin matrix regions within the wing joiners showed features consistent with static overload failure. There was no evidence of fatigue crack propagation within the fracture surfaces of the wing joiners.

Right wing root rib

Examination of the GFRP root rib reinforcement showed that there was an absence of surface preparation or bonding along the bottom half of the bond line, on the surface that bonded to the wing root skin. This would have compromised the strength of the structure in this area and promoted peeling fracture under the wing bending loads (Figure 8).

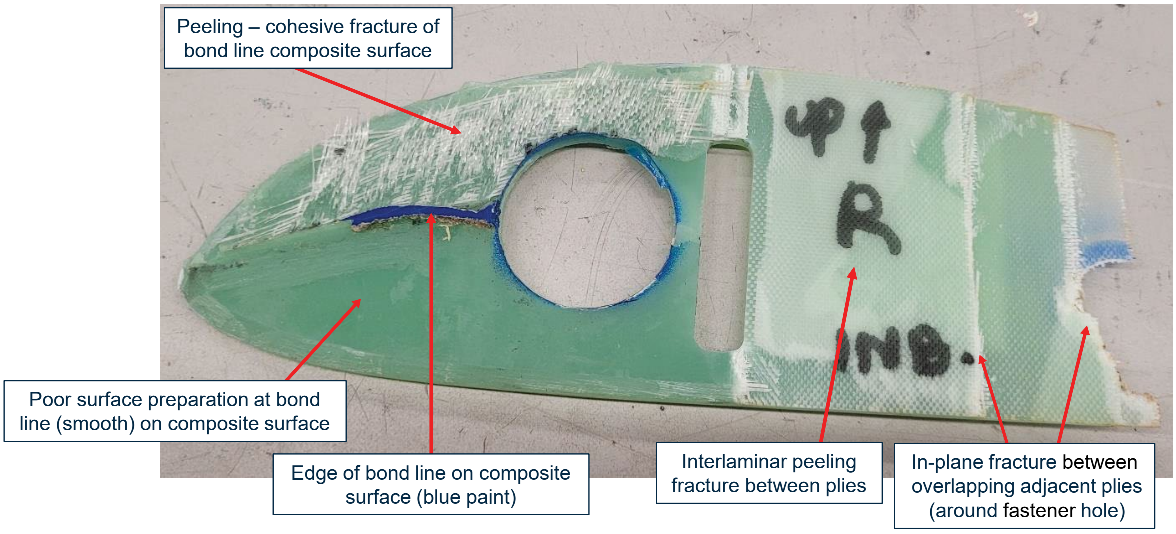

Figure 8

Inboard face, forward portion of right wing GFRP root rib

On the opposite (outboard) surface to that shown in Figure 7, the forward CFRP root rib reinforcement also exhibited poor surface preparation, poor adhesive bond and dis-bonding regions, where the joiner guides and wing bolt covers attached to the root rib.

Operator's internal investigation

Findings

The operator carried out a review at its production facility and identified that at the time of the accident, no acceptance test procedures or specific quality checks were in place for wing joiners upon receipt from the supplier. No tracking procedures were in place for individual components and wing joiners were not individually serialised.

The wing joiners are supplied as standard off-the-shelf components, with the forward joiner measuring 2.5 m and the aft joiner 2.0 m. During production assembly of the CGT-50, the joiners are shortened to the required length (2.48 m and 1.5 m) when the wings are offered up to the fuselage. As the wings are built using manual lay-up, the production facility expected some variation in final joiner length.

The wing joiners from aircraft 570, the sister ship to aircraft 569 and produced in the same batch, also did not meet specification on length. At the time of this discovery, aircraft 570 had been shipped to a customer. The operator requested the wing joiners to be returned and they were replaced with another set that met the correct specification.

Shorter forward wing joiners of 2.25 m were used on a previous product, the CGT-45, the last example of which was produced in 2019.

The operator identified that there were two possible scenarios to explain the incorrect joiner lengths on aircraft 569 and 570. Either the forward and rear wing joiners were cut to different incorrect lengths during aircraft assembly; or the joiners used for 569 and 570 were from old stock, which remained in stores at the production facility from the CGT-45 production, which it considered more likely.

A review of wing joiner stock at the production facility following the accident revealed that all existing joiners in stock were the expected length, and so the operator did not consider there was an issue with the supply of the joiners.

Resulting actions

In response to the findings of both the AAIB's and its own investigation, the operator implemented the following measures to improve quality and component control in its production facility.

- Introduced quality control procedures to perform a dimensional check, weigh and test bending deflection of wing joiners upon receipt at production facility.
- Added dimensional tolerance values for wing joiners to design drawings and quality control procedures.
- Allocated individual serial numbers to wing joiners.
- Modified the wing design and simplified the production process to allow wing joiners to be used in standard supplied lengths, without the need for shortening during assembly. This included aft joiners being ordered in 1.5 m length rather than 2.0 m.
- Modified the design of the joiner guide end caps to increase the adhesive surface area and bond strength.

The operator also indicated its intention to amend the pre-flight assembly for installation of wing joiners onto the aircraft

Airworthiness considerations

CAP 722 indicates that while certified UA and/or certified equipment may be used for specific category operations as a means of risk reduction, or as a mitigating measure in the risk assessment, there is no requirement for UA's operating in the specific category to be designed, certified, built or tested to any recognised standards.

The OA process relies on operational and procedural mitigations to separate the hazards associated with the particular UA operation from uninvolved persons that could be harmed. At the time of the operator's application, the process did not include any independent design, technical or airworthiness assurance.

During the CAA's assessment of the operator's application, the aircraft was not inspected. The CAA advised the investigation that, based on the relative complexity of operation, the disclosed operational mitigations and the fact that the operation was due to be conducted in a sterile area, this was not considered a necessary part of the application process.

Failure modes

Section 1.18 of the operator's OSC Volume 2 outlined the known failure modes that the operator considered could occur on a CGT-50 UA during flight. Information was presented in tabular form listing the failure mode, the immediate technical consequence, its impact on the control of the UA, recommended pilot actions in response to the failure, resulting outcomes and whether such outcomes lead to operation outside the pre-defined operational volumes.

It included the failure mode *'Structural failure of primary aircraft structure (fuselage, wing, horizontal or vertical stabiliser),'* which it described as an improbable single point failure. This failure mode would result in immediate loss of control of the UA, with uncontrolled flight into terrain (UFIT). The only documented pilot action was to initiate the emergency response plan. The operator stated that the operational volume was defined such that any UFIT would occur in the ground buffer area[15].

Safety risk assessment

The operator's OSC Volume 3 described the operator's hazard identification and the classification of likelihood and severity for each hazard. In Section 2.8, the operator defined 61 risk mitigations (numbered M1 to M61) based on its experience of CGT-50 operations. The mitigations largely related to pilot competence, training, operational procedures and separation of any potential aircraft hazard from uninvolved persons on the ground.

Mitigation M45 stated *'CGT-50 UAS manufactured according to standards defined in OSC Volume 1 Attachment 2'.*

M45 was listed as a mitigation against several hazards relating to UA system or component failures. It was also listed as a mitigation against hazard No 1: *'Airframe failure: including wings, main frame and total tail surfaces'*. This hazard was described as having outcomes including mid-air collision with another aircraft or collision with an uninvolved person.

Section 4 of Volume 3 presented each of the identified hazards in the format of Claim, Argument, Evidence. For hazard No 1, the OSC claimed that risk was 'Tolerable and ALARP'[16] and presented the following argument:

> *'CGT-50 manufactured to quality standards. CGT-50 is maintained according to defined procedures. Risk of harming uninvolved persons and third party aircraft due to airframe failure is minimised and controlled within the operation. The operation is taking place over a controlled ground area and within a NOTAM to minimise the risk to uninvolved persons and third party aircraft. Operation is taking place below 400 ft and safety distances are maintained with ground personnel. The operation is taking place with visual observers to observe third party aircraft approaching the operation area and to keep the UA within line of sight at all times. If an uncontrolled flight occurs due to a critical system failure, the flight simulation shows the system will remain within a horizontal distance of %45 [sic] of flight altitude and at least 1:1 ground risk buffer is used for this operation.'*

Footnote

[15] A minimum 150 m buffer from the aircraft's flight path is defined in the OSC to mitigate against ground risk. The OSC states that the aircraft will remain withing the ground buffer, even in uncontrolled conditions.

[16] As Low As Reasonably Practical.

Analysis

Proximity of the aircraft to ground personnel

The planned operation

The OA was granted upon a comprehensive OSC produced by the operator, in consideration of the range's safety plan. Multiple flights by different operators were scheduled to occur inside a controlled area.

Clear controls were established to minimise risk to *'uninvolved'* spectators. They were confined to a visitors area which was well over the required distance from the planned flight path. Everyone else in the operating area was considered *'involved'* and would attend safety briefings. The RSO would monitor personnel movement on the range and give takeoff permission for each flight. Methods of communicating, maintaining situation awareness, and announcing hazards were specified.

The accident flight

Weather issues meant the accident flight was brought forward, inadvertently overlapping with the pyrotechnics operatives being under the flight path. The RSO might have been unaware of their presence, and/or it was not identified as a hazard. Although the pyrotechnics operatives' vehicles were visible on the aircraft's FPV camera, the intended flight path was perhaps closer to the road underneath than the flight team realised.

The flight team called for takeoff permission. However, unclear radio communications with the range – and absent radio contact with pyrotechnics operatives – probably reduced situation awareness and impeded the intended takeoff decision making process. The aircraft subsequently struck the ground just over 100 m from the pyrotechnics operatives.

The OA process puts onus on protecting uninvolved persons. Although the event underwent substantial planning, and occurred in a controlled operating area, the resulting proximity of the falling aircraft to the pyrotechnics operatives alludes to practical challenges related to protecting involved persons, robust communications, and the pressures of schedule changes. Consequently, the range has reviewed its safety plan and made several improvements to methods of operational communication and hazard management.

Failure of the right wing

Detailed examination of the wing joiner fracture faces identified the presence of both tensile and compressive static overload failures within the fractured fibres. This was consistent with flexural failure of the joiners due to upwards wing bending.

The reinforced GFRP structure at the root rib also experienced delamination, intra-ply failure and bonding failure. Because the wing joiners and root rib were effectively independent from each other (ie the joiner guides were not mechanically fastened, nor effectively bonded to root rib), there was insufficient evidence to determine with certainty the failure sequence. So, it was not determined whether the root rib or wing joiners failed first. Together though, the observed failures indicated that the wing assembly did not have sufficient structural strength to carry the wing bending loads encountered during the accident flight.

The wing separated when the aircraft was in 1 g straight and level flight. From the in-flight video and flight log, there appeared to be nothing unusual about the wing loading or the accelerations experienced by the aircraft during the accident flight. Although it is acknowledged that sampling rate limitations meant the recorded acceleration data would have been unlikely to capture any instantaneous peak accelerations.

Production quality of wing components

The wing joiners supplied by the production facility and fitted to the accident aircraft were shorter than the design specification. This would have compromised their ability to transfer wing bending loads to the fuselage. The operator determined the most likely scenario was that old stock wing joiners from the CGT-45, last produced in 2019, were inadvertently fitted to aircraft 569 and sister aircraft 570 at the production facility.

No tracking procedures were in place for individual components in the production facility and wing joiners were not individually serialised. There was also an absence of quality control procedures for externally supplied components. As a result of this investigation, the operator has undertaken steps to serialise wing joiners and introduce quality checks on receipt of components at the production facility.

The manufactured quality of the wing joiners, particularly the rear joiner which exhibited resin-rich areas, was found to be of a lower quality in comparison with that of typical aerospace grade materials and structures.

The reinforced GFRP root rib and wing-fuselage attachment exhibited areas of poor/absent surface preparation and variable uniformity of adhesive application between the GFRP and the wing structure. This created a bond quality that was poor in comparison to normal aerospace standards of construction. Combined with variable bonding of the joiner guides to the wing structure, this would have resulted in a lack of strength in the wing root structure which could have contributed to the wing failure.

Operational experience

While the operator conducted quality checks upon receipt of a new aircraft from the production facility, at the time of the accident these checks did not specifically include the wing joiners. Having conducted several hover tests and training flights on the accident aircraft without issue in the weeks prior to the accident, the operator considered it to be a proven airframe with validated flight time. No problems were encountered on the previous flights which could have alerted the operator to issues with the wing joiners or the structural integrity of the wing attachment. As such, the reduced-length wing joiners supplied with aircraft 569 were not identified until the investigation.

Design considerations

The CGT-50 was not designed, built or tested to any recognised standards, nor was it required to be, in order to be operated in the specific category, or for the operator to hold an operational authorisation. There were no defined load cases for the flight envelope of the aircraft and structural load-carrying components were not designed to any pre-determined limit or ultimate loads. The design, development and testing process involved a large degree of trial and error. The manufacturer considered the CGT-50 to be a proven aircraft, based on a substantial number of 'successful' test flights and operational flights.

The CGT-50 wing design was such that the wing joiner guides were intentionally slightly longer than the joiners, to accommodate a degree of variability in the installed joiner position. In addition, the absence of the end cap on the left wing forward joiner guide on the accident aircraft, would have created the possibility for the forward wing joiner to be inserted further than intended into the left wing. Despite this, aircraft examination showed that the installation of the forward wing joiner was more biased towards the right wing, a situation which was exacerbated by the installation of joiners that were shorter than required. This would have resulted in an uneven load distribution on the forward joiner.

At the time of the accident, neither the aircraft assembly instructions in the CGT-50 user manual nor the aircraft assembly checklist, included instructions to centralise the joiners on the fuselage, to ensure that an equal joiner length was inserted in each wing. The operator has since introduced assembly instructions which specify this requirement. It also stated its intention to modify the aircraft design to mitigate this condition.

Risk mitigation considerations in the OSC

The hazard of a failure of primary aircraft structure, and the associated consequences, were recognised and documented in the operator's OSC. While the OSC risk assessment for this hazard relied predominantly upon mitigations related to pilot competence, training, operational procedures and separation of any potential aircraft hazard from uninvolved persons on the ground, it also relied on the technical mitigation that the aircraft was manufactured and maintained to quality standards. The investigation found that this mitigation was ineffective in preventing the hazard from being realised, due to the design and production quality issues described in this report.

Conclusion

The right wing separated from the aircraft during flight because the wing assembly on the accident aircraft did not have sufficient structural strength to carry the wing bending loads encountered in 1 g straight and level flight. The combination of wing joiners that were shorter than the design specification, a wing design that accommodated a degree of movement of the joiner position and the absence of procedures to ensure the wing joiners were installed symmetrically during aircraft assembly, created a condition where there was an uneven bending load distribution on the forward wing joiner.

Although the flight occurred in a controlled area, away from protected uninvolved spectators, the aircraft fell next to personnel involved in the range operation. The range has taken safety action to improve communication and hazard management during operations.

Safety actions

The range reviewed its safety plan and stated its intention to ensure robust radio communications between parties on the range; ensure the location of every person on the range is known before takeoff is permitted; introduce standard phraseology for takeoff permission; introduce a "stop stop stop" call; and advise range employees to "stop and think" about the ramifications of a schedule change before continuing to operate.

To improve quality control measures at its production facility, the operator introduced serial numbers and conformance checks for wing joiners and simplified the production process. It modified the wing design in relation to wing joiner length, including the addition of dimensional tolerances and to increase the adhesive surface area for joiner guide end caps.

Published: 16 April 2026.

AAIB Correspondence Reports

These are reports on accidents and incidents which were not subject to a Field Investigation.

They are wholly, or largely, based on information provided by the aircraft commander in an Aircraft Accident Report Form (AARF) and in some cases additional information from other sources.

The accuracy of the information provided cannot be assured.

Accident

Aircraft Type and Registration:	Bellanca (American Champion) Decathlon 8KCAB, G-TALX
No & Type of Engines:	1 Lycoming AEIO-320-E1B piston engine
Year of Manufacture:	1980 (Serial no: 595-80)
Date & Time (UTC):	30 June 2025 at 1223 hrs
Location:	Tatenhill Aerodrome, Staffordshire
Type of Flight:	Training
Persons on Board:	Crew - 1 Passengers - 1
Injuries:	Crew - None Passengers - None
Nature of Damage:	Damage to left landing gear leg, left side of forward fuselage, left wing struts, and propeller
Commander's Licence:	Commercial Pilot's Licence
Commander's Age:	65 years
Commander's Flying Experience:	6,321 hours (of which 72 were on type) Last 90 days - 195 hours Last 28 days - 57 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot and further enquiries by the AAIB

Synopsis

During a routine landing at Tatenhill Aerodrome, the left landing gear leg fractured, causing the pilot to lose directional control. The aircraft came to rest in grass beside the runway. Both occupants were uninjured.

The investigation found that the leg fractured due to fatigue cracking, which was initiated by surface corrosion. A manufacturer service letter regarding preventative maintenance inspections for corrosion existed, but this was not mandatory under the Approved Maintenance Program. It could not be determined whether these additional inspections would have effectively detected any pre-existing damage or corrosion.

History of the flight

G-TALX was being flown by a flight instructor, who was conducting an introduction to aerobatics flight with a student pilot. The flight was the instructor's second flight of the day; the previous flight in the same aircraft was uneventful.

The instructor flew the approach to land on Runway 24. Shortly after touching down, he reported that the left landing gear leg separated at the bend at the top of the leg. He applied aileron to hold the left wing up until the airspeed reduced. The left wing subsequently dropped, touching the runway, and the aircraft veered to the left coming to rest off the runway in a grass area. The propeller also struck the ground and suffered damage . Neither occupant sustained injuries, and they exited the aircraft unaided.

Figure 1

Photo of G-TALX after coming to rest in a grassy area

Aircraft information

The 8KCAB Decathlon is a high-wing, two-seat monoplane with tailwheel configuration, used primarily as a sports and aerobatic trainer and manufactured by American Champion Aircraft. At the time of the accident, 10 aircraft were registered in the UK, including G-TALX.

The Decathlon is normally fitted with steel landing gear legs, although the manufacturer offers an option to retrofit aluminium landing gear legs.

G-TALX was equipped with steel landing gear legs, which had been installed at 4,999 airframe hours when the aircraft underwent extensive repairs following an unrelated failure of a landing gear attachment bolt during an engine ground-run in May 2018. The engine and propeller were also replaced, and the aircraft returned to service in April 2020.

When the accident occurred, G-TALX had accrued 5,612 airframe hours.

Maintenance Information

Manufacturer Service Letter regarding corrosion

In May 2018, the manufacturer published Service Letter SL-449 *'Corrosion Inspection and Preventative Maintenance',* applicable to several of its aircraft types, including the Decathlon. The SL included specific checks for the landing gear legs, stating that there had been reports of both the steel and aluminium landing gear legs having suffered corrosion. The SL description stated:

'Corrosion has been reported on several aircraft based in moderate and severe operating environments. This service letter is intended to supplement Advisory Circular 43-4A and provide guidance for affected components.'

Though the SL did not specify what was considered *"moderate and severe operating environments"*, the referenced FAA Advisory Circular 43-4B[1] (which now supersedes version 43-4A), includes *Corrosion Severity Maps* in Section 4.12. The map for Europe indicates that most of the United Kingdom constitutes a "moderate" operating environment, with coastal areas and Northern Ireland shaded as regions of "severe" corrosion.

Regarding steel landing gear legs, the SL stated:

'Steel gear legs have been reported with intergranular and exfoliation types of corrosion. Gear leg material is 4130, 4340, or 6150 steel with protective finish per American Champion specification CFP-1… While not a structural concern (the cracks are located in areas of low stress) corrosion may develop. Visually inspect the gear leg for corrosion and finish condition.'

The SL provided information regarding the frequency of inspection. According to the corrosion severity map in the FAA Advisory Circular, Tatenhill Aerodrome lies within an area considered 'Moderate Zone', which the SL considered requiring a corrosion inspection every 45 days. The investigation did not find any Airworthiness Directives mandating the implementation of the SL by operators or maintenance organisations.

Annual Inspection

The aircraft logbook indicated the last 100-hour Annual Inspection check was performed on 20 March 2025, and 40 airframe hours later the accident occurred. G-TALX had a valid Certificate of Airworthiness, Airworthiness Review Certificate, insurance, and certificate of registration.

The Work Pack for the most recent 100-hour inspection in March 2025 included a check for the presence of corrosion on the landing gear. The Work Pack indicated that no corrosion was detected on the landing gear legs. There was no evidence that the recommendations of SL-449 had been embodied.

Landing gear leg examination

The fractured landing gear leg was retrieved, and the attachment point to the fuselage subsequently removed during repairs. The AAIB obtained both parts, shown in Figure 2.

Footnote

[1] US Federal Aviation Administration Advisory Circular 43-4B, 11 September 2018, available at https://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_43-4B.pdf [accessed 5 December 2025].

Figure 2

The two parts of the fractured left landing gear leg, recovered by the AAIB

The fracture occurred near the fuselage attachment point. There was some abrasion damage to the paintwork at points on the leg, which was attributed to it having scraped along the runway following the fracture, as the leg remained attached to the aircraft via the hydraulic brake fluid line.

The AAIB commissioned further metallurgical examination of the fracture surfaces. It observed mechanical damage on the lower side of the section of the leg which remained attached to the fuselage, likely caused by contact with the runway. The upper section was undamaged but exhibited signs of corrosion.

There was a loss of paint on the underside of the leg along the line where the fracture had occurred, with corrosion evident on the exposed surface. This is shown in Figure 3. The red arrow indicates a region in which corroded thumbnail-shaped features were observed along the edge of the fracture, shown by Figure 4.

Figure 3

Corrosion on the underside of the landing gear leg

Figure 4

Zoomed in view of thumb-nail shaped corroded features

After the surface was cleaned to remove corrosion artefacts, examination of the thumbnail shaped features under a scanning electron microscope (SEM) indicated that the largest thumbnail feature was 1.66 mm deep. Detailed examination of these regions exhibited features characteristic of fatigue crack propagation. An examination of the remainder of the fracture surface revealed features characteristic of an overload failure in high-strength steel. There was no evidence of manufacture defects such as impurities in the material.

Related events

Although the AAIB has had no previous reports of similar events in the UK, the investigation identified two accidents bearing similarity to G-TALX that have been reported, also involving Decathlon aircraft.

The first, N5026B in Alaska, USA, in 2012, involved a failure of the left landing gear leg on landing. The investigation[2] found that:

> *'The spring steel left main landing gear assembly was fractured approximately 5 inches from the fuselage attach point. An examination of the landing gear assembly was performed by the NTSB Materials Laboratory, and revealed the gear leg fractured due to fatigue that initiated from pits on the lower surface of the leg.'*

The associated metallurgy report[3] identified features in the surface fracture which appear almost identical to those identified by the metallurgy analysis shown in the *Landing gear leg examination* section of this report.

Footnote

[2] N5026B Aviation Investigation Final Report, NTSB, Published 12 June 2013, available at https://data.ntsb.gov/carol-repgen/api/Aviation/ReportMain/GenerateNewestReport/84611/pdf [accessed 31 July 2025].

[3] Materials Laboratory Factual Report for N5026B investigation, NTSB, available at: https://data.ntsb.gov/Docket/Document/docBLOB?ID=40384518&FileExtension=.PDF&FileName=Materials%20Laboratory%2015%20-%20Factual%20Report%2012-148%20(10%20Embedded%20Images)-Master.PDF [accessed 31 July 2025].

LN-LCU, in Norway on 2 October 2015[4]. The investigation reported that:

> *"The right landing gear collapsed under the strain of the hard landing as a consequence of latent weaknesses in terms of steel fatigue cracks. AIBN has reason to believe that these cracks, and thus the latent weakness, was not easily discovered during visual inspection."*

Analysis

Upon landing, the left landing gear leg failed due overload failure, because of fatigue crack propagation which was initiated by surface corrosion, likely resulting from surface paint loss or damage. G-TALX was operated frequently for flying training, involving multiple takeoffs and landings. Such conditions are conducive to accelerating fatigue crack growth.

The aircraft was maintained in accordance with the CAA Approved Maintenance Programme, which included a 100-hour corrosion check, but not the manufacturer's additional inspections as these were not mandatory. The investigation could not establish whether corrosion was present at the last inspection; its location and underside paint loss may have hindered detection. A previous similar investigation into an accident involving a Decathlon experiencing a landing gear leg failure remarked that corrosion and fatigue cracks in this area are not easy to visually identify.

It was not possible to determine whether the non-mandatory inspections in Service Letter SL-449 would have detected the damage before the accident to G-TALX occurred. However, operators of this aircraft type may wish to consider incorporating SL-449 into their maintenance programmes, as this would still provide additional opportunities to detect corrosion.

Conclusion

The accident occurred because the left landing gear leg suffered an overload failure on touchdown, resulting from fatigue crack propagation which had initiated where surface corrosion had developed.

The corrosion was likely able to occur because paint loss had exposed the steel surface to the environment. While the investigation could not establish whether corrosion was present at the last inspection, similar investigations remarked that it is not easy to identify fatigue cracking and corrosion from visual inspections in this part of the landing gear leg.

The manufacturer has produced a service letter pertaining to inspection for corrosion prevention, but this is not a mandatory maintenance requirement. Had it been incorporated into the aircraft's maintenance program, it was not possible to determine whether this would have detected the presence of corrosion or the onset of fatigue cracks.

Footnote

4 NSIA (Norway) investigation into LN-LCU, available at https://nsia.no/Aviation/Aviation/Published-reports/2016-12 [accessed 31 July 2025].

Accident

Aircraft Type and Registration:	Ikarus C42 FB100 Bravo, G-MOOD
No & Type of Engines:	1 Rotax 912ULS piston engine
Year of Manufacture:	2015 (Serial no: 1509-7418)
Date & Time (UTC):	3 July 2025 at 1030 hrs
Location:	Field next to Wycombe Air Park, Buckinghamshire
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - 1
Injuries:	Crew - 1 (Serious) Passengers - 1 (Serious)
Nature of Damage:	Aircraft destroyed
Commander's Licence:	National Private Pilot's Licence
Commander's Age:	61 years
Commander's Flying Experience:	898 hours (of which 800 were on type) Last 90 days - 135 hours Last 28 days - 8 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot and other AAIB enquiries

Synopsis

The aircraft suffered a total loss of power shortly after takeoff and collided with trees during an attempted forced landing, seriously injuring both occupants. The cause of the power loss could not be positively determined. The aircraft may have been supplied with incorrectly graded or contaminated fuel. To prevent reoccurrence, the operator has purchased a bowser now used to supply their aircraft with UL91 fuel.

History of the flight

The flight was intended as an introductory flight with a passenger who had no previous experience in light aircraft.

The pilot conducted a pre-flight inspection of the aircraft including a fuel dip and water check. The aircraft was started and power checks completed with nothing abnormal noted. Approximately 15 to 20 minutes after engine start, the takeoff was commenced from Runway 24 at Wycombe Air Park. The takeoff initially proceeded normally with no unusual sounds or vibration. The pilot reported that he switched off the fuel pump and retracted the flaps at 300 ft and reduced power slightly at 500 ft as was his normal practice. Shortly after this, at approximately 700 ft, the engine ran down smoothly and then stopped.

The pilot lowered the nose and reported to the airfield radio operator his intention to land in a field. He did not declare a MAYDAY. The pilot reported switching the fuel pump back on but did not attempt a restart or perform other drills. He reported his focus was to concentrate on the flying and maintaining airspeed. He considered that a landing straight ahead was not possible due to a line of trees and he chose a field to the right to aim for. The pilot was confident of a successful landing in the field but the aircraft collided with trees which pitched the aircraft nose towards the ground resulting in a steep nose-down impact (Figures 1 and 2).

A helicopter pilot witnessed the accident and landed in the field to assist the pilot and passenger with egress. Both were seriously injured.

Accident site

Figure 1
G-MOOD after the accident

Figure 2
Accident site location

Aircraft and fuel information

The aircraft was powered by a Rotax 912ULS four stroke engine. The engine manufacturer specified that the fuel used by the engine should have minimum values of 85 for Motor Octane Number (MON), 95 for Research Octane Number (RON), and 91 for Anti Knock Index (AKI)[1].

The aircraft had been fuelled that morning from a jerry can containing premium 'E5' unleaded petrol[2] (also referred to as motor gasolene or Mogas) that had been purchased from a local petrol station four days before the accident. The fuel containers were used only to refuel the flying school's C42 aircraft. The school did not record the volume of fuel used to refuel the aircraft, so the quantity of fuel that the aircraft received during this refuel could not be verified.

Aircraft and fuel examination

The aircraft was examined by the company normally responsible for its maintenance. No physical cause of the engine failure was identified.

After the accident the operator arranged for laboratory analysis of a sample of the fuel from the aircraft's tank. The AAIB was provided a copy of a report from the fuels laboratory which indicated that there was no contamination or water found in the sample, the ethanol content was <2%, but the RON was 87.1, significantly lower than that specified by the aircraft manufacturer.

After the initial fuel assessment, the operator reported that they took a further sample, believed to be from the fuel container the aircraft was refuelled from, and sent it to a different

Footnote

1 Available at https://www.flyrotax.com/products/912-uls-s [accessed on 21 October 2025].

2 E5 unleaded petrol, often sold as 'super unleaded', is a premium motor fuel for spark ignition engines that contains a maximum of 5% bioethanol and has a RON of between 97 and 99.

fuel laboratory for a more detailed analysis. The results of this assessment indicated that the fuel sample was equivalent to a light kerosene, diesel or jet fuel. The analysis further identified that the MON, of 74.2, would not be suitable for spark ignition engines. The required minimum MON for UL91 and 100LL are 91.0 and 99.6 respectively.

Shortly after this accident, another aircraft operated by the same flying school suffered engine problems during the initial part of the takeoff, but it landed on the runway remaining ahead with only minor damage. All the school's aircraft were examined and three were found to have a jelly-like substance in the carburettor bowls. These three aircraft had been fuelled with the same batch of fuel as G-MOOD.

Meteorology

Weather conditions were good with a light and variable wind, visibility 7 – 10 km and temperature of 24°C.

Other information

The Light Aircraft Association (LAA) provides information on the use of Mogas[3] including advice regarding storage, operating limitations and vapour lock. One operating limitation is '*unleaded Mogas fuel is restricted to operation with a fuel tank temperature not exceeding 20°C.*'

CAA Safety Sense Leaflet 28, '*Fuel Handling and Storage*'[4], also contains guidance to GA pilots on the safe storage of fuel and recommends measures to maintain the quality of fuel supplied to aircraft. The Safety Sense Leaflet also provides information associated with the keeping of records associated with storage and dispensing of fuel to aircraft.

The CAA's advice in the Skyway Code[5] regarding engine failure at low level is '*If a failure happens shortly after take-off, landing ahead is safer than attempting to turn back. Assess the area immediately in front of you and pick the place that is likely to cause the least damage*.'

Analysis

The cause of the engine failure was not positively determined although a mechanical failure of the engine was ruled out. The aircraft had been sufficiently refuelled to conduct the planned flight, so fuel exhaustion was also ruled out.

An assessment of the fuel within the fuel tank and within the fuel containers that the aircraft was refuelled from suggested that the fuel supplied to the engine may have been of a lower octane number than specified by the engine manufacturer and may have been contaminated

Footnote

3 Light Aircraft Association (2023), TL 2.26 PROCEDURES FOR USE OF E5 UNLEADED AND E5 SUPER UNLEADED MOGAS, Issue 4 https://www.lightaircraftassociation.co.uk/infolibrary/12b2f27a-697b-4b04-9846-c01f3054cca9 [accessed on 24 December 2025].

4 Available: https://www.caa.co.uk/publication/download/14496 [accessed on 3 March 2026]

5 Civil Aviation Authority (2023) CAP1535 The Skyway Code, p140. Available at https://www.caa.co.uk/publication/download/16112 [accessed on 21 October 2025].

with a diesel, light kerosene or jet fuel. This would have prevented the fuel from igniting in the engine cylinders when the spark plugs were activated.

Another potential cause was vapour lock and there were some risk factors present for this including the use of Mogas and the high temperature on the day. Electric fuel pumps offer protection against vapour lock during takeoff and leaving the pump on until reaching a higher altitude will potentially give pilots a wider choice of landing sites should an engine fail when the pump is turned off and more time to decide on the best course of action. Nevertheless, the CAA's advice in the Skyway code regarding engine failure at low level is that landing ahead is safer than attempting to turn back to the airfield.

With limited options ahead due to woodland, the pilot of G-MOOD selected an appropriate field and correctly prioritised aircraft control during the emergency. This avoided a stall/spin scenario that may have had worse consequences.

Conclusion

The aircraft sustained a total loss off power shortly after takeoff. The pilot made the decision to attempt a forced landing in a field to his right, but struck a line of trees on the edge of the field he was attempting to land in. The aircraft struck the ground seriously injuring both occupants.

The cause of the power loss could not be positively determined, but it is possible that the fuel that had been supplied to the aircraft was not of the correct grade or quality to allow normal combustion within the engine. The source of the fuel quality issue was not determined.

Safety actions

Following this accident the operator purchased a bowser to supply its aircraft with UL91 fuel.

Accident

Aircraft Type and Registration:	Z-1RA Stummelflitzer, G-ZIRA
No & Type of Engines:	1 Rotec R2800 piston engine
Year of Manufacture:	2008 (Serial no: PFA 342-14596)
Date & Time (UTC):	3 March 2026 at 1515 hrs
Location:	White Waltham Airfield
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - None
Injuries:	Crew - 1 (Serious) Passengers - N/A
Nature of Damage:	Aircraft damaged beyond economical repair
Commander's Licence:	Private Pilot's Licence
Commander's Age:	63 years
Commander's Flying Experience:	983 hours (of which 177 were on type) Last 90 days - 11 hours Last 28 days - 2 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot

Summary

On the day of the accident the pilot conducted two flights in the aircraft. Prior to the first flight, the pilot performed a full pre-flight inspection, including a fuel drain check for water. No abnormalities were identified and the aircraft subsequently operated for 90 minutes with no reported issues. Less than an hour later, the aircraft was refuelled and prepared for a second flight. The pilot stated that the engine started normally and the aircraft was taxied for approximately 5 minutes to the threshold for Runway 07. The power checks were reportedly normal, so the pilot lined up on the runway and took off.

After reaching a height of around 200 ft, the pilot became aware that the climb performance was poor and the engine speed was lower than normal. The pilot levelled off and considered that the engine sounded 'hesitant', so initiated a right turn to remain over the airfield and switched on the auxiliary fuel pump. The engine then stuttered and stopped.

The pilot attempted to land on a grass area between some hangars and a line of parked aircraft but stated that the aircraft did not respond to an attempt to flare prior to touchdown. It landed heavily, nose-first and then cartwheeled. The pilot suffered multiple injuries but was able to self-extricate from the wreckage. The aircraft was severely damaged, and no investigation of the engine or flight controls was conducted. The reasons for the loss of engine power and lack of flare response were not determined.

Serious Incident

Aircraft Type and Registration:	DG Flugzeugbau DG-1000T, G-CKLY
No & Type of Engines:	1 SOLO 2350 C piston engine
Year of Manufacture:	2005 (Serial no: 10-66T6)
Date & Time (UTC):	26 April 2025 at 1623 hrs
Location:	Court Place Farm Nature Park, Oxfordshire
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - 1
Injuries:	Crew - None Passengers - None
Nature of Damage:	Damage to propeller, fuselage and left wing. Propeller coupling separated
Commander's Licence:	Light Aircraft Pilot's Licence
Commander's Age:	57 years
Commander's Flying Experience:	1,500 hours (of which 52 were on type) Last 90 days - 9 hours Last 28 days - 4 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot and further enquiries by the AAIB

Synopsis

During a local flight, the pilot deployed the engine to gain height to return to the home airfield, when he heard a loud bang. He stowed the engine and after confirming he had control of the aircraft, made a successful landing at Weston-on-the-Green Airfield. An inspection of the aircraft revealed some minor damage to the airframe caused by the propeller when it detached from the engine. The propeller was subsequently recovered from the local area.

The coupling which attached the propeller to the output drive of the engine had separated through a rubber element with one half remaining attached to the engine and the other half attached to the propeller. The investigation determined that the desired surface roughness had not been achieved on the drive-side coupling and this had resulted in an adhesive bond failure between the rubber element of the coupling and the drive-side component. It was concluded that the design of the part and the manufacturing process, had made it challenging to achieve the required surface roughness to effectively bond the rubber to the aluminium. The surface roughness was not identified because of a lack of inspection and acceptance criteria for the surface finish after blasting. The manufacturer has made changes to the coupling to ensure the surface finish is achieved and therefore a more effective bond between the coupling components.

History of the flight

The pilot and passenger departed from Weston-on-the-Green Airfield at 1701 hrs for a local sightseeing flight of approximately 30 minutes. This was the second flight of the day and a duplicate of the previous flight which the pilot had completed with another passenger. Prior to the initial flight a compression check and ground run of the engine had been successfully performed. The intention was to use the engine if there was no thermal activity and this resulted in it being used three times on each flight.

The pilot started the engine for the third time when they were approximately 12 km to the south of the airfield, and he reported a loud bang followed by an engine overspeed warning. He realised they had lost the propeller and responded by closing the throttle and switching off the ignition. He retracted the engine after it had stopped and turned off the fuel cock.

After confirming that the control surfaces were functional, he radioed for a straight-in approach to Runway 01 at Weston-on-the-Green. The landing was uneventful and both occupants exited the aircraft without injury. The propeller was recovered and provided to the AAIB along with the coupling (Figure 1) for further investigation.

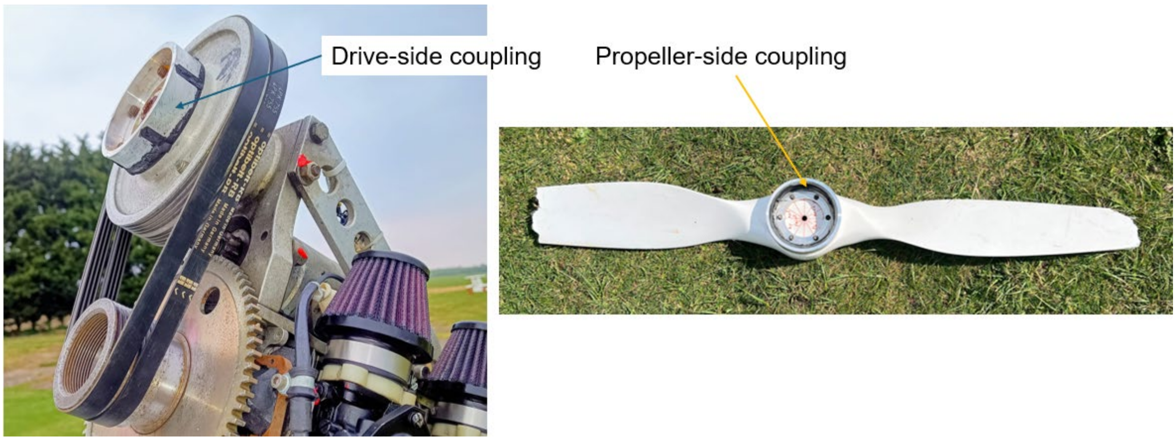

Figure 1
Engine and propeller after the flight

Aircraft information

The DG-1000T is a tandem two-seat, self-sustaining, powered sailplane constructed predominantly from carbon-fibre and was certified by the EASA in 2006. The SOLO 2350 C two-stroke auxiliary engine is mounted on a retractable pylon housed behind the cockpit. It drives a 1.48 m two-bladed propeller via a 2.3:1 reduction belt drive (Figure 2). The twin belts are tensioned by an eccentric steel shaft which adjusts the relative position of the final drive pulley. By 2013 there had been approximately 10 reported failures of the eccentric shaft with associated loss of propeller, so an EASA Airworthiness Directive (AD 2013-0217[1] September 2013) was issued prohibiting the use of the engine in-flight. The manufacturer

Footnote

[1] EASA Safety Publications Tool Airworthiness Directive 2013-0217 [accessed January 2026].

released a modification (SB 4603-14) in April 2014 to the eccentric shaft which allowed the engine to be used again. However, in March 2015 a further AD 2015-0052[2] was issued after there were failures of the modified eccentric shaft. This prompted an inspection and prohibition of the engine use until another modification (SB 4603-17), which introduced a two-part rubber coupling, was installed.

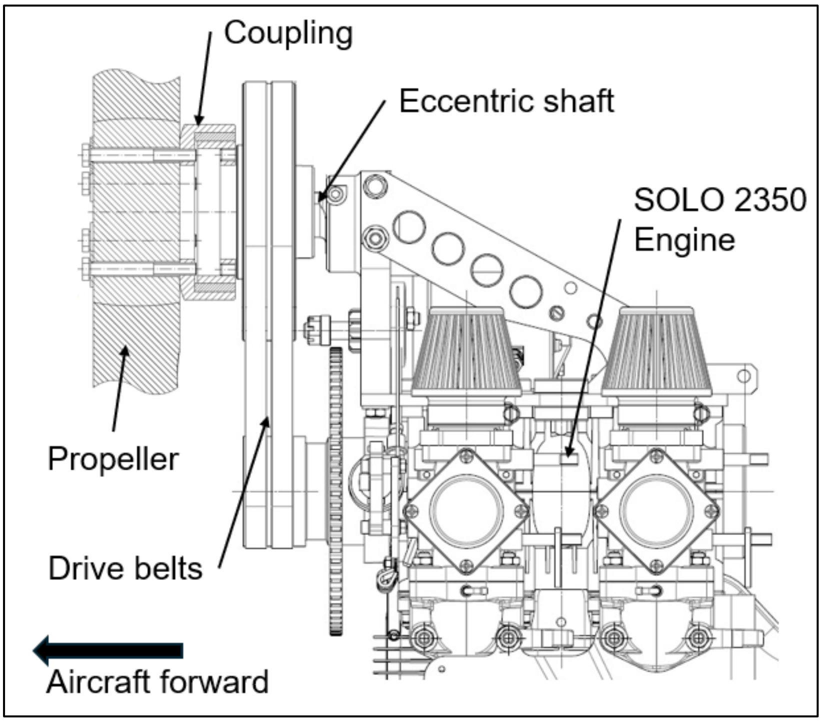

Figure 2

Engine / Coupling / Propeller system

Coupling

The two-part rubber coupling attaches the propeller to the final drive of the engine. The coupling consists of two machined aluminium components joined together with vulcanised rubber (Figure 3). The coupling was designed to reduce the loads on the eccentric shaft from the gyroscopic effects of the propeller.

Foonote

2 EASA Safety Publications Tool Airworthiness Directive 2015-0052 [accessed January 2026].

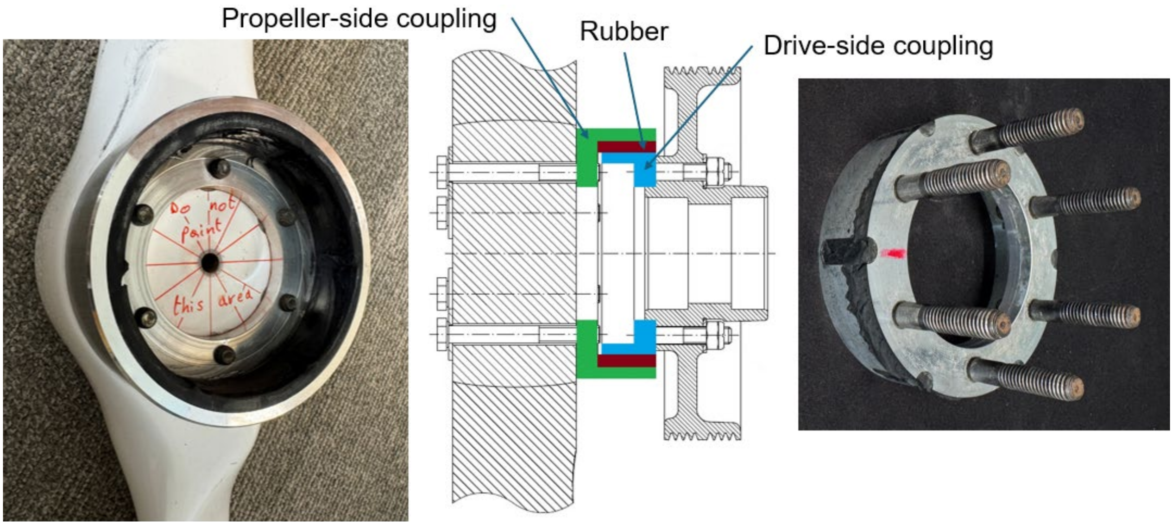

Figure 3
Two-part rubber coupling

The coupling starts as one piece of 7022-T6 aluminium alloy bar stock and it is partially machined (Figure 4) to include a 28 mm deep by 5.5 mm wide circular groove to accept the rubber. The groove is then media blasted with 850 – 1180 µm corundum particles and then cleaned with an alcohol-based primer. The surface finish is not specified on the drawing except for a generic Ra 3.2 µm which is typical for CNC machining. There are no production acceptance criteria for the surface blasted areas. A surface primer, followed by adhesive is then applied to the surfaces to be bonded to the rubber. The Nitrile Butadiene Rubber (NBR) is pressed into the groove and the coupling is heated to vulcanise the rubber, resulting in a rubber Shore A hardness of 70. After the vulcanisation process is complete the remaining features are machined into the coupling, which includes separating the coupling into two metallic components joined together by the NBR. This manufacturing process ensures good concentricity of the two metallic halves of the coupling. No protective treatments are applied as 7022 aluminium was determined to have sufficient corrosion resistance for the component's five-year life in service.

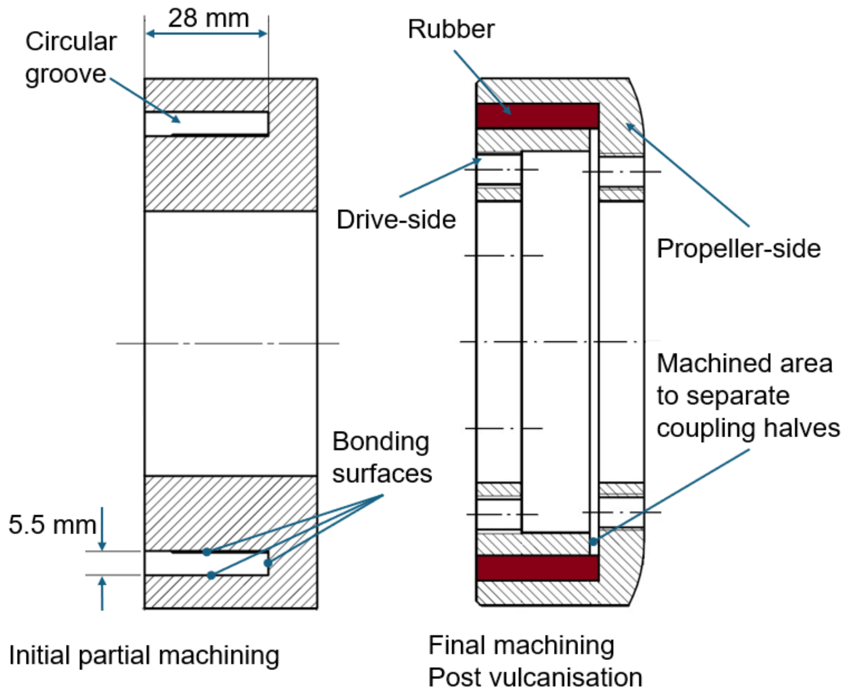

Figure 4

Coupling manufacturing steps

During the qualification process of the coupling, it was subjected to a total of 50 hours of ground and in-flight testing. Sequences were conducted similar to those in CS 22.1849[3] but modified to consider that the maximum endurance was limited to 1.5 hours on a single tank of fuel. There were no repetitive acceptance tests specified or conducted on the production couplings.

The failure of the coupling fitted to G-CKLY, and other reported failures, has led to the EASA issuing AD 2025-0112[4] to prohibit the use of the engine in flight which has been fitted with modification SB 4603-17 coupling. AD 2025-0112 was subsequently superseded by AD 2025-0220[5] in October 2025 which introduces a further design evolution of the coupling (DG TN1000-52) to allow use of the engine in flight to recommence.

Aircraft examination

After the landing the aircraft was inspected by the pilot and damage was found on the top of the fuselage, solar panel and the top surface of the left wing (Figure 5).

Footnote

3 Easy Access Rules for Sailplanes and Powered Sailplanes (CS 22) Subpart H – Engines. CS 22.1849 – Endurance Test: Duration for engine endurance runs are 120 minutes. Easy Access Rules for Sailplanes and Powered Sailplanes (CS-22) (Amendment 1) [accessed December 2025].

4 EASA Safety Publications Tool Airworthiness Directive 2025-0112 [accessed January 2026].

5 EASA Safety Publications Tool Airworthiness Directive 2025-0220 [accessed January 2026].

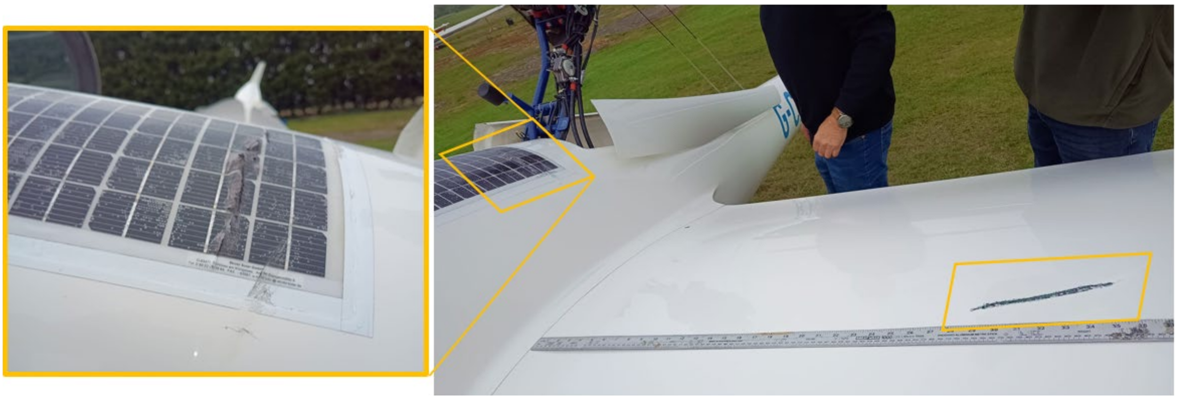

Figure 5
Damage found to G-CKLY after landing

The pilot described the propeller having green scratches indicating it had fallen through trees and was recovered from woodland to the north of the A40. The propeller with half of the coupling still attached, was sent to the AAIB along with the drive-side half of the coupling.

The two halves of the coupling were examined and it was found that the rubber element was predominantly retained within the propeller-side coupling. Both halves showed two distinct regions of the failure, the first; a cohesive failure of the rubber element; and the second, an adhesive failure between the rubber element and the drive-side coupling (Figure 6).

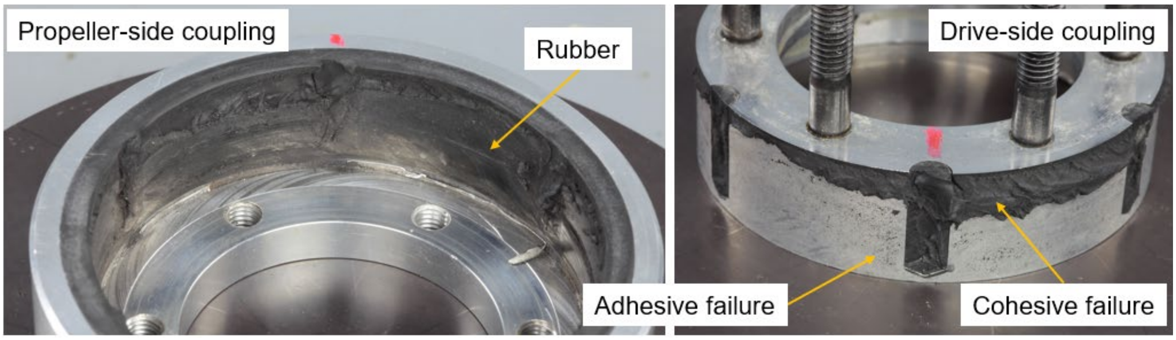

Figure 6
Observed adhesive and cohesive failures

Fourier Transform Infrared spectroscopy confirmed the rubber to be a vulcanised Nitrile Butadiene rubber by comparing it to a known material sample. The Shore A hardness was tested on a sample and an average result of 72.2 was obtained from five tests. Using a combination of UV light and energy dispersive X-ray methods it was possible to confirm the present of the primer and adhesive which had been applied prior to the vulcanisation process.

Figure 7 is a photo montage of the drive-side coupling showing the areas of coverage where the rubber had bonded to the aluminium. This area is approximately 1/3 of the total area.

Figure 7

Area of bonded rubber to the drive-side coupling

A random section was chosen from the drive-side coupling and by using acetone, as much rubber as possible was removed. It was not possible to completely remove all the rubber from the surface pitting and therefore an accurate surface roughness measurement could not be made. Instead, a qualitative assessment was made at three different locations on the section as shown in Figure 8.

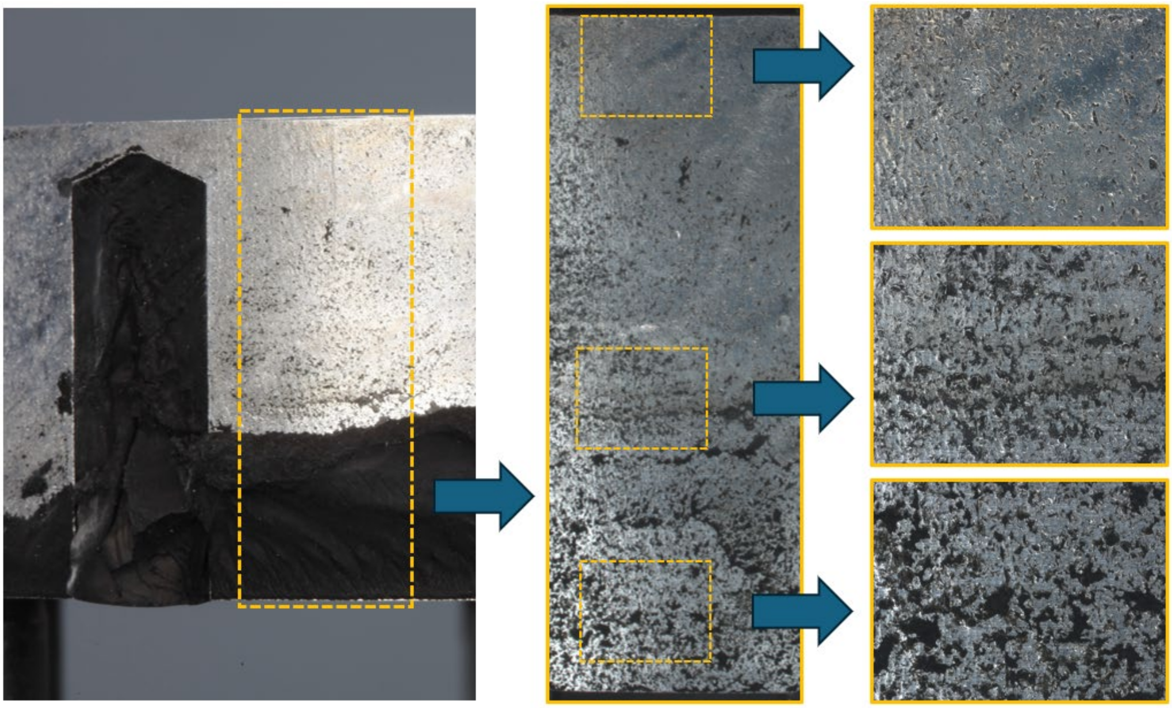

Figure 8

Examination of the drive-side coupling surface finish

The areas where bonding was more effective directly correlated to a rougher surface finish, such that would be expected from the media blasting process. The density of media blast impacts gradually decreased from the bonded to the de-bonded region.

A section of the propeller-side coupling was prepared in the same way by removing the rubber and the surface finish was compared between two area of similarly bonded rubber on each of the coupling halves (Figure 9). The drive-side coupling (left) had visible horizontal machining marks along with a non-uniform distribution and size of media impacts. The propeller-side coupling showed a uniformly distributed and even media blast finish with no visible machining marks.

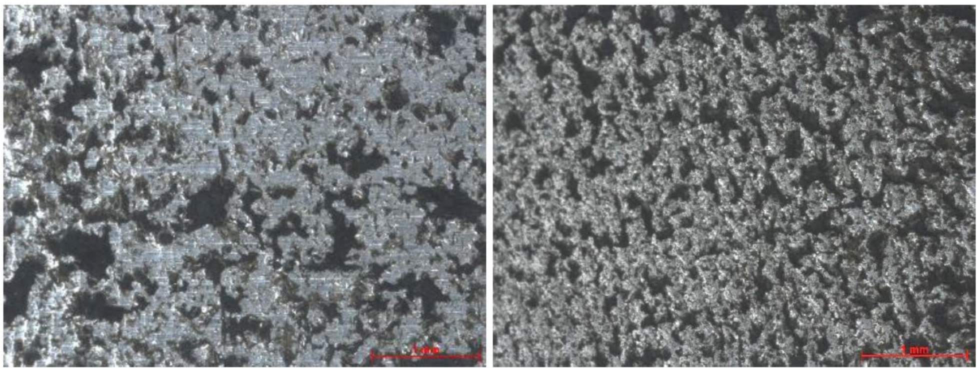

Figure 9

Comparison between drive-side (left) and propeller-side (right) surface finish

Analysis

The bonding failure of the NBR dampening component within the drive coupling was primarily a result of an adhesive bond failure between the rubber and the drive-side coupling. This led to a cohesive failure of the rubber that had successfully bonded to both halves of the coupling. The bonded area of the drive-side coupling was approximately 33% of the total area and was insufficient to transmit the engine torque load to the propeller. This resulted in the loss of the propeller when the coupling separated and the damage to the aircraft.

The investigation determined that the lack of adhesion between the rubber and the drive-side coupling was due to a lack of surface roughness on the drive-side coupling. During manufacturing, the narrow, machined annular groove (for the rubber) was media blasted to achieve a rougher than machined surface finish (> Ra 3.2 μm). But there was evidence showing that the finish was not consistent over the area to be bonded to the rubber, with it being rougher near the top of the groove and gradually decreasing further into groove. Machining marks were still visible in the areas of minimal media blasting.

It was concluded that the design of the component and the manufacturing process had made achieving a consistent media blasted finish challenging. The lack of surface roughness was not captured due to the absence of drawing control or production acceptance criteria being specified. The manufacturer has stated that in the latest standard of the coupling (DG TN1000-52) the two halves of the coupling are media blasted separately to ensure better access and a consistent finish.

Conclusion

A lack of surface roughness on the drive-side coupling resulted in an adhesive bond failure of the NBR to the aluminium. The remaining 33% of the bonded area was insufficient to transfer the loads and suffered a cohesive failure of the rubber. This resulted in the coupling separating and the loss of the propeller. The latest design of the coupling has made changes to ensure an effective bond is achieved over the total area of the coupling halves.

AAIB Record-Only Investigations

This section provides details of accidents and incidents which were not subject to a Field or full Correspondence Investigation.

They are wholly, or largely, based on information provided by the aircraft commander at the time of reporting and in some cases additional information from other sources.

The accuracy of the information provided cannot be assured.

Record-only UAS investigations reviewed: February - March 2026

5 Feb 2026 **DJI M30T** Cwmllynfell, Neath Port Talbot

The UA struck overhead electrical cables immediately after takeoff and was destroyed. The flight was being conducted at night for operational requirements, and the cables had not been observed. The remote pilot was unaware that the mapping software highlighted the presence of cables if the appropriate mapping layer was selected. They said that this learning had been shared with the operator's training team.

3 Mar 2026 **MA Tiger Trainer OBL** Dewsbury, Yorkshire

The MA was being operated at a model flying club site located on the edge of an urban area when it experienced a failure of the electronic speed controller, becoming unresponsive to control inputs. This resulted in a flyaway event and the MA subsequently struck a pallet of goods in the grounds of a business unit, adjacent to the flying club site.

18 Mar 2026 **Apellix B1** City of Westminster, London

The UA was being used for window cleaning. Five minutes into the flight, the remote pilot noticed a warning light indicating a problem with the GPS lock. He stopped the cleaning operation and attempted to land the aircraft but it did not respond to the controller inputs. It collided with the building and fell to the ground within the safety cordon.

Miscellaneous

This section contains Addenda, Corrections and a list of the ten most recent Aircraft Accident ('Formal') Reports published by the AAIB.

The complete reports can be downloaded from the AAIB website (www.aaib.gov.uk).

TEN MOST RECENTLY PUBLISHED FORMAL REPORTS ISSUED BY THE AIR ACCIDENTS INVESTIGATION BRANCH

3/2015 Eurocopter (Deutschland) EC135 T2+, G-SPAO
Glasgow City Centre, Scotland
on 29 November 2013.

Published October 2015.

1/2016 AS332 L2 Super Puma, G-WNSB
on approach to Sumburgh Airport
on 23 August 2013.

Published March 2016.

2/2016 Saab 2000, G-LGNO
approximately 7 nm east of Sumburgh Airport, Shetland
on 15 December 2014.

Published September 2016.

1/2017 Hawker Hunter T7, G-BXFI
near Shoreham Airport
on 22 August 2015.

Published March 2017.

1/2018 Sikorsky S-92A, G-WNSR
West Franklin wellhead platform, North Sea
on 28 December 2016.

Published March 2018.

2/2018 Boeing 737-86J, C-FWGH
Belfast International Airport
on 21 July 2017.

Published November 2018.

1/2020 Piper PA-46-310P Malibu, N264DB
22 nm north-north-west of Guernsey
on 21 January 2019.

Published March 2020.

1/2021 Airbus A321-211, G-POWN
London Gatwick Airport
on 26 February 2020.

Published May 2021.

1/2023 Leonardo AW169, G-VSKP
King Power Stadium, Leicester
on 27 October 2018.

Published September 2023.

2/2023 Sikorsky S-92A, G-MCGY
Derriford Hospital, Plymouth, Devon
on 4 March 2022.

Published November 2023.

Unabridged versions of all AAIB Formal Reports, published back to and including 1971, are available in full on the AAIB Website

http://www.aaib.gov.uk

GLOSSARY OF ABBREVIATIONS

aal	above airfield level
ACAS	Airborne Collision Avoidance System
ACARS	Automatic Communications And Reporting System
ADF	Automatic Direction Finding equipment
AFIS(O)	Aerodrome Flight Information Service (Officer)
agl	above ground level
AIC	Aeronautical Information Circular
amsl	above mean sea level
AOM	Aerodrome Operating Minima
APU	Auxiliary Power Unit
ASI	airspeed indicator
ATC(C)(O)	Air Traffic Control (Centre)(Officer)
ATIS	Automatic Terminal Information Service
ATPL	Airline Transport Pilot's Licence
BMAA	British Microlight Aircraft Association
BGA	British Gliding Association
BBAC	British Balloon and Airship Club
BHPA	British Hang Gliding & Paragliding Association
CAA	Civil Aviation Authority
CAVOK	Ceiling And Visibility OK (for VFR flight)
CAS	calibrated airspeed
cc	cubic centimetres
CG	Centre of Gravity
cm	centimetre(s)
CPL	Commercial Pilot's Licence
°C,F,M,T	Celsius, Fahrenheit, magnetic, true
CVR	Cockpit Voice Recorder
DME	Distance Measuring Equipment
EAS	equivalent airspeed
EASA	European Union Aviation Safety Agency
ECAM	Electronic Centralised Aircraft Monitoring
EGPWS	Enhanced GPWS
EGT	Exhaust Gas Temperature
EICAS	Engine Indication and Crew Alerting System
EPR	Engine Pressure Ratio
ETA	Estimated Time of Arrival
ETD	Estimated Time of Departure
FAA	Federal Aviation Administration (USA)
FDR	Flight Data Recorder
FIR	Flight Information Region
FL	Flight Level
ft	feet
ft/min	feet per minute
g	acceleration due to Earth's gravity
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
GPWS	Ground Proximity Warning System
hrs	hours (clock time as in 1200 hrs)
HP	high pressure
hPa	hectopascal (equivalent unit to mb)
IAS	indicated airspeed
IFR	Instrument Flight Rules
ILS	Instrument Landing System
IMC	Instrument Meteorological Conditions
IP	Intermediate Pressure
IR	Instrument Rating
ISA	International Standard Atmosphere
kg	kilogram(s)
KCAS	knots calibrated airspeed
KIAS	knots indicated airspeed
KTAS	knots true airspeed
km	kilometre(s)
kt	knot(s)
lb	pound(s)
LP	low pressure
LAA	Light Aircraft Association
LDA	Landing Distance Available
LPC	Licence Proficiency Check
m	metre(s)
mb	millibar(s)
MDA	Minimum Descent Altitude
METAR	a timed aerodrome meteorological report
min	minutes
mm	millimetre(s)
mph	miles per hour
MTWA	Maximum Total Weight Authorised
N	Newtons
N_R	Main rotor rotation speed (rotorcraft)
N_g	Gas generator rotation speed (rotorcraft)
N_1	engine fan or LP compressor speed
NDB	Non-Directional radio Beacon
nm	nautical mile(s)
NOTAM	Notice to Airmen
OAT	Outside Air Temperature
OPC	Operator Proficiency Check
PAPI	Precision Approach Path Indicator
PF	Pilot Flying
PIC	Pilot in Command
PM	Pilot Monitoring
POH	Pilot's Operating Handbook
PPL	Private Pilot's Licence
psi	pounds per square inch
QFE	altimeter pressure setting to indicate height above aerodrome
QNH	altimeter pressure setting to indicate elevation amsl
RA	Resolution Advisory
RFFS	Rescue and Fire Fighting Service
rpm	revolutions per minute
RTF	radiotelephony
RVR	Runway Visual Range
SAR	Search and Rescue
SB	Service Bulletin
SSR	Secondary Surveillance Radar
TA	Traffic Advisory
TAF	Terminal Aerodrome Forecast
TAS	true airspeed
TAWS	Terrain Awareness and Warning System
TCAS	Traffic Collision Avoidance System
TODA	Takeoff Distance Available
UA	Unmanned Aircraft
UAS	Unmanned Aircraft System
USG	US gallons
UTC	Co-ordinated Universal Time (GMT)
V	Volt(s)
V_1	Takeoff decision speed
V_2	Takeoff safety speed
V_R	Rotation speed
V_{REF}	Reference airspeed (approach)
V_{NE}	Never Exceed airspeed
VASI	Visual Approach Slope Indicator
VFR	Visual Flight Rules
VHF	Very High Frequency
VMC	Visual Meteorological Conditions
VOR	VHF Omnidirectional radio Range

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Air Accidents Investigation Branch