Accident

Aircraft Type and Registration:	1) Ventus-2CT, G-KADS 2) E1 Antares, G-CLXG
No & Type of Engines:	1) 1 Solo Kleinmotoren Gmbh 2350 piston engine 2) 1 Lange Flugzeugbau EA 42 electric engine
Year of Manufacture:	1) 2012 (Serial no: 231) 2) 2019 (Serial no: 89E58)
Date & Time (UTC):	17 August 2023 at 1356 hrs
Location:	Melton Mowbray, Leicestershire
Type of Flight:	1) Private 2) Private
Persons on Board:	1) Crew - 1 Passengers - None 2) Crew - 1 Passengers - None
Injuries:	1) Crew - 1 (Fatal) Passengers - N/A 2) Crew - None Passengers - N/A
Nature of Damage:	1) Aircraft destroyed 2) Damage to right wing and wingtip missing
Commander's Licence:	1) Sailplane Pilot's Licence 2) Sailplane Pilot's Licence
Commander's Age:	1) 67 years 2) 78 years
Commander's Flying Experience:	1) 2,760 hours (of which 458 were on type) Last 90 days - 138 hours Last 28 days - 82 hours 2) Approx 2,500 hours (of which 188 were on type) Last 90 days - 18 hours Last 28 days - 6 hours
Information Source:	AAIB Field Investigation

Synopsis

During a gliding competition flight, both gliders entered a thermal just to the south of Melton Mowbray at a similar height. Although the gliders were initially on opposite sides of the thermal, changes in the angle of bank of both gliders brought their flight paths into conflict and they collided. The pilot of G-CLXG was able to land his glider safely and was uninjured but the tail of G-KADS was severed in the collision and the glider descended out of control. The pilot was fatally injured.

The British Gliding Association (BGA) took action to raise awareness regarding the increased risk of midair collisions in gliding competitions.

History of the flight

Both gliders were taking part in a competition being held at Husbands Bosworth gliding centre. The competition took the form of a multi-day event with a different route and task set daily for the participants. Both the pilot of G-CLXG and the pilot of G-KADS had significant experience in gliding and fixed wing flying. Both had flown numerous competitions before and had operated in many different environments.

On the day of the accident the task consisted of a multi-leg route with turning points. G-CLXG launched first at 1236 hrs with G-KADS following a minute behind. The task took the gliders north-northeast from Husbands Bosworth towards a turning point just north of Melton Mowbray before routing south to the next point close to Oxford. Both gliders completed the first leg and were en route to the second turning point when the accident happened (Figure 1).

Figure 1

Location of the accident ©Google 2024

Having left the first turning point the pilot of G-CLXG entered a thermal just south of Melton Mowbray at 1352 hrs to gain some height for his onward flight. As he could see there was already a glider in the same thermal, he joined turning in the same direction (left) as that glider. He had completed two turns in the thermal when the pilot of G-KADS also joined the thermal at 1354 hrs and at approximately the same height. The pilot of G-KADS also made his turns to the left to match the manoeuvring of the other gliders in the thermal. G-KADS was positioned between the 5 o'clock to 7 o'clock positions relative to G-CLXG. The aircraft remained in these relative positions for three complete turns in the thermal.

As the pilot of G-KADS began a fourth turn in the thermal he increased his angle of bank and therefore his turn rate. Shortly afterwards the pilot of G-CLXG began the process of leaving the thermal once he had completed the fourth turn by starting to decrease his bank angle and therefore rate of turn. As a result, G-KADS turned inside the path of G-CLXG and this brought the two flight paths into conflict as both were at around the same height. The two gliders collided at 1356 hrs at an altitude of 2,900 ft amsl with the right wing of G-CLXG severing the tail of G-KADS. G-KADS began to tumble out of control and struck an area of rough ground between houses in the southern area of Melton Mowbray. The pilot was fatally injured. The pilot of G-CLXG initially intended to abandon his glider but found he had sufficient control and was able to land in a field. The right wing of G-CLXG was damaged and the right winglet and outboard flaperon[1] were missing. The pilot of G-CLXG was uninjured.

Accident site

G-KADS

The glider, minus the tail and a section of the rear fuselage, struck the ground in a grass field beside a housing estate on the southwest edge of Melton Mowbray (Figure 2). The rear fuselage and tail fell to the ground 450 m to the east of the main accident site, in an open area of vegetation.

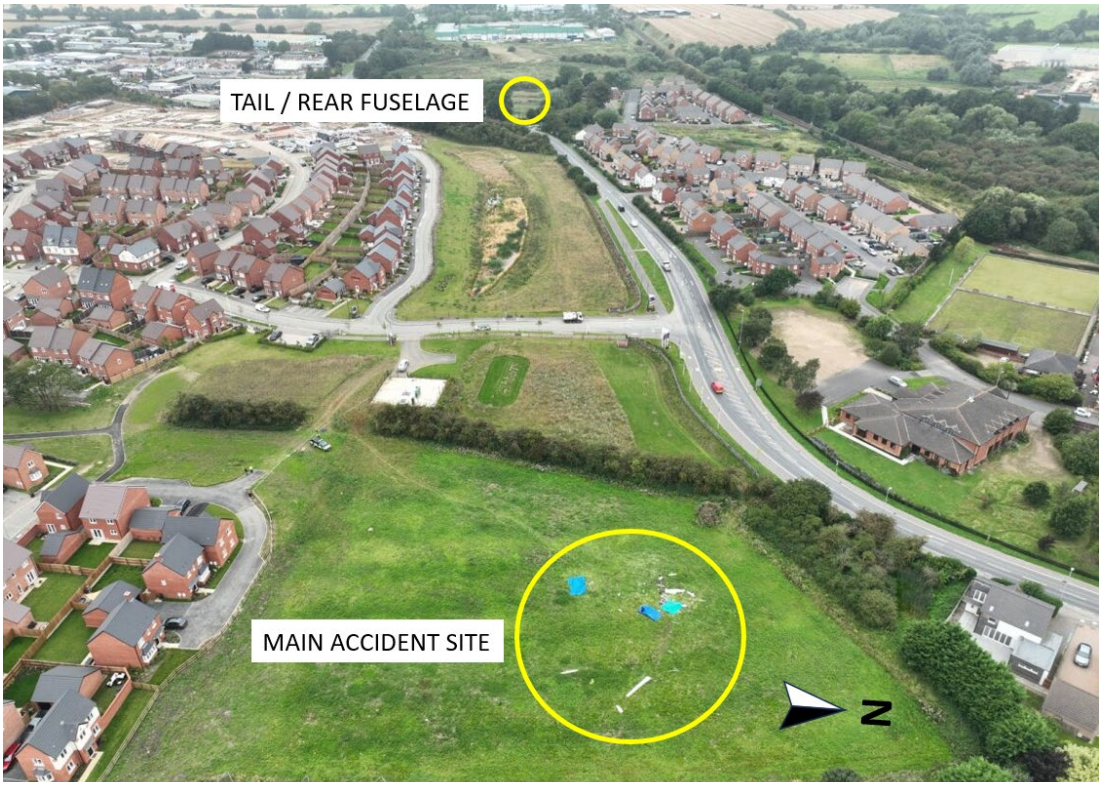

Figure 2

G-KADS accident site

Footnote

[1] A flaperon is a trailing edge control surface combining the roll-control function of an aileron with the increased lift function of a flap.

The glider struck the ground at high speed in a nose-down, left wing low attitude. The impact was not survivable, and the glider was destroyed. Examination of the wreckage identified that the airbrakes were open at impact, although it was not possible to determine whether they had opened in flight due to the collision impact on the airbrake mechanism, or by pilot action. The landing gear was up. Deformation of the canopy latching mechanism showed that the canopy was latched closed at impact. The pilot's four-point seat harness was fastened, and his parachute had not been used, with the ripcord present in an undeployed condition. The glider's fuel tank was found punctured with no fuel present, and no fire had occurred.

G-CLXG

G-CLXG landed in a grass field 1.4 nm southeast of the G-KADS accident site. The glider was mostly intact apart from the right winglet and outermost section of right flaperon which were missing and not subsequently recovered (Figure 3).

Figure 3

G-CLXG after the field landing

G-CLXG's right wing was damaged between 1.6 m and 3.5 m outboard from the wing root due to the impact with G-KADS' rear fuselage. The upper and lower wing skins were torn and delaminated, and the flaperon control surface at the trailing edge had split open due to rearward deflection of the wing (Figure 4). The right flaperon moved in response to movement of the control column through the flaperon inboard and outboard drive arms, which were undamaged. The battery compartment access panel in the lower wing skin was missing, the battery pack was not damaged and the powerplant battery management system did not indicate that any faults were present.

Figure 4
Damage to G-CLXG's right wing

The outer right wingtip, adjacent to the missing winglet and flaperon section, was damaged with paint cracking at the leading edge and large areas of delamination of the lower wing skin from the foam core material. There were no witness marks present on these damaged areas indicating that this damage had not been caused by direct contact with G-KADS during the collision but was due to the wing's structural response when the collision occurred.

Recorded information

G-KADS

Several items of substantially damaged avionics were recovered from the wreckage of G-KADS including a lxnav LX9070 moving map and task planner.

The non-volatile memory from these units was, in part, recoverable but none of the recovered data pertained to the accident flight.

G-CLXG

G-CLXG was fitted with a lxnav LX9000, a very similar unit to the LX9070 fitted to G-KADS, but with a smaller display. As G-CLXG was able to successfully land, the integrated flight logger was downloaded for the incident flight. The flightpath for G-CLXG is shown below in Figure 5.

FLARM devices

The LX9070 fitted to G-KADS and the LX9000 fitted to G-CLXG both incorporated FLARM transceivers; FLARM is an electronic system designed to alert pilots to a potential collision.

FLARM units use GPS position and barometric data to accurately position themselves and they transmit this information to other FLARM units within range. This information is then processed by an algorithm within each FLARM unit to predict any potential conflicts with other nearby FLARM equipped aircraft. FLARM does not only consider how close another

aircraft is but whether its flight path presents a threat of collision. It provides the pilot with the location and the threat level of other aircraft, based on time to collision, but offers no solution for avoidance. It is up to the pilot to locate the other aircraft visually and to take action to avoid a collision.

The use of FLARM devices is common on gliders, which don't always carry conventional ATC transponders. These transmissions can be received by suitably configured receivers on the ground, processed and then re-transmitted to provide other airspace users with an awareness of glider activity. The AAIB, using data from one such service provider, was able to retrieve the position information transmitted by G-KADS and this is shown, alongside the flightpath of G-CLXG, in Figure 5 as both gliders manoeuvred in the thermal.

Figure 5

Flightpaths of G-KADS and G-CLXG in a thermal prior to the collision
© 2022 SeeYou software by Naviter

Both gliders had models of FLARM that integrated into large LCD navigation displays in the cockpit. The models fitted to both gliders work with three levels of alert:

- Low alarms: For distant FLARM targets (13-20 seconds before possible collision).
- Medium alarms: For distant FLARM targets (7-12 seconds before possible collision).
- High alarms: For very close FLARM targets (0-6 seconds before possible collision).

The equipment allows the pilot to select various options for the FLARM warnings including which levels of warnings are displayed, how the warnings are displayed and whether an

audio tone sounds. There is an option for a voice annunciation and the pilot is able to cancel or silence the warnings for up to a minute in flight. The manufacturer of the units recommends that for competition flying the warning threshold is either set to Medium (only alerting for medium or high risk) or High (only alerting for high risk) because otherwise too many warnings may be triggered. The scale of the navigation screens can also be adjusted to meet the requirements of the pilot at that point in flight.

The pilot of G-CLXG had not changed the default factory settings of his FLARM and it was therefore set to show warnings at the Low setting (showing all warnings low, medium and high). The investigation could not establish what settings the pilot on G-KADS had on his FLARM.

FLARM log

The FLARM units fitted to G-KADS and G-CLXG were both PowerFLARM which have a greater detection range and reception capability from a wider range of electronic conspicuity devices than standard FLARM.

Examination of the flight log downloaded from G-CLXG, showed the presence of encoded FLARM status messages. These were analysed by the manufacturer, FLARM Technology AG, and this showed that G-KADS was detected by G-CLXG's FLARM, prior to G-KADS joining the thermal that G-CLXG was established in.

It was also possible using historic data for G-KADS and G-CLXG to show that both FLARM installations had good coverage and detection range, with no significant blind spots.

FLARM modelling

FLARM Technology AG were also able to model the expected performance of both gliders' FLARM installations. They concluded that both units would have provided 4-5 seconds of warning prior to the collision if the alerts on each individual device had been correctly configured and not supressed. The modelling also made certain assumptions about each device's quality of radio coverage and the veracity of the source data used for the modelling.

Witnesses

There were several other gliders around the area in which the collision occurred. Whilst none of these pilots saw the collision, they did see both aircraft in the thermal. Other pilots reported that the thermals that day were relatively weak due to the strength of the wind but that the day was perfectly good for the task they were to fly. They reported that the cloud base did mean that the gliders were compressed into a relatively small height band when they were in a thermal.

A witness on the ground saw the collision and reported that one glider seemed to be slightly above the other one but that they were on the same trajectory, turning left. The witness saw the two gliders collide and heard what was described as an "almighty bang." The witness described that the tail of G-KADS came off immediately and fell straight down with the aircraft then tumbling forward, nose first. The witness lost sight of G-KADS as it descended.

Aircraft examination

The recovered parts of G-KADS' fuselage were reassembled (Figure 6). This showed that G-CLXG's right wing had struck the fuselage from below, in an upwards direction. The rudder cables, fin ballast tank dump cable and elevator pushrod had failed in overload and the pitot-static system tubes were severed.

Figure 6

Detached section of G-KADS' rear fuselage and fin

Survivability

The pilots of both gliders were wearing parachutes. Examination of the canopy release mechanism of G-KADS showed that no attempt was made to jettison the canopy. It is possible that the pilot was rendered unconscious by the collision or that the forces on him due to the motion of the glider once it lost its tail meant he could not make any attempt to abandon the aircraft before it struck the ground. The time between the collision and G-KADS striking the ground was around 18 seconds.

Aircraft information

G-KADS

G-KADS was a single-seat glider with a wingspan of 18 m. The annual maintenance check was completed on 31 January 2023 and the glider had a current Airworthiness Review Certificate. The glider was equipped with a retractable powerplant consisting of a two-cylinder piston engine and five-bladed propeller which stowed in the fuselage when not in use. It was constructed from composite materials and was painted white, with the registration markings and competition number 'KS' painted in purple. It did not have any high-contrast paintwork and was not fitted with a strobe system.

G-CLXG

G-CLXG is a single-seat powered glider with a wingspan of 20 m, equipped with an electric powerplant permitting the glider to self-launch as an alternative to launching by aerotow. The powerplant runs on lithium-ion battery packs mounted in the wings, between the leading edge and the main spar. The annual maintenance check was completed on 7 April 2023 and the glider had a current Airworthiness Review Certificate. It was constructed from composite materials and was painted white, with the registration markings and competition number '895' painted in dark blue. It did not have any high-contrast paintwork and was not fitted with a strobe system.

View from the cockpits

All gliders have blind spots where the pilot cannot see. These are most often the 45° segment behind the pilot and a 45° segment below. There may also be areas which are obscured by the aircraft canopy frame although both G-KADS and G-CLXG were modern gliders with good visibility and a single piece canopy/windscreen.

External lighting

Neither glider was equipped with anti-collision lights or strobes, nor were they required to be. Gliders have not traditionally been fitted with external lights as most were not flown outside of daylight hours. Older lights were also often heavy and had significant power requirements which could not be met by a glider. Modern light-emitting diode (LED) technology offers a low weight and very low power alternative. There are systems available for gliders offering very bright lights in both red and white, which can be fitted to improve visibility of the glider to other pilots. These systems can also be integrated with FLARM, changing the strobe flash rate and/or colour if a FLARM warning is triggered.

Meteorology

An aftercast showed that there was an area of high pressure over Scandinavia and a low-pressure system over the Atlantic to the west of the UK. There were no frontal systems affecting the area with generally south-easterly winds and good visibility. There were some scattered clouds in the area although these were breaking up and the sky was largely clear. The sun was in south southwest and was 50° above the horizon meaning it was relatively high in the sky. Reports from other pilots flying in the area of the collision reported that where there was cloud, the base was around 3,000 ft agl.

Organisational information

Glider soaring

A thermal is an upward current of warm air and glider pilots will use thermals to gain height. They will circle around the centre of a thermal as they attempt to climb. Once pilots have found a thermal, to gain the best lift they need to find and remain in the centre, this may involve increasing or decreasing their radius of turn. Pilots may have differing ideas as to the location of the centre of the thermal and therefore where the best lift may be found. With

gliders in a competition flying the same or very similar routes, it would not be uncommon for there to be several gliders all entering and climbing in the same thermals along the route.

BGA guidance

The BGA Soaring Protocol[2] describes the safety protocols to be used when soaring. The protocol had been developed through many years of experience and accident/incident analysis. The protocol does not replace the need for pilots to obey the rules of the air or the Air Navigation Order.

The protocol suggests that when joining a thermal, a pilot should circle in the same direction as those already established, that the entry into the thermal should be planned so as to retain continual visual contact with other aircraft at or near the entry height and that established gliders have right of way. Once in the thermal the protocol emphasises that lookout is paramount and that pilots should not neglect it to look inside at the cockpit. Pilots are advised to maintain visual contact with the other gliders and to position so that the other pilots can also see them. One glider should never turn inside another glider at a similar level as to do so may risk reducing their separation. If a pilot turns inside another glider, there can be a period in which neither pilot can see the other glider. The protocol recommends that should a pilot lose visual contact with a nearby glider then then safest action would be to leave the thermal.

Competition flying

The BGA describes competition flying as an important part of gliding. Competitions offer pilots the chance to fly alongside like-minded people, compare their skills, learn from others as well as to enjoy some social activities and meet others from around the country. Events can last from a single day to multiple flights over a two-week period. Many glider pilots enjoy taking part in competitions both at their home airfields and when visiting others.

BGA gliding competitions are organised in accordance with the BGA '*Rules for Rated Competitions*'[3]. This document contains the rules and procedures for organisers and competitors to follow. Pilots need to be familiar with the contents of the rulebook as well as any local rules and procedures for the airfield they are flying from. The competition day begins with a briefing where topics such as the weather, the tasking for the day, airspace and any safety issues that might have occurred are covered. The rulebook also contains a requirement for a pilot safety committee to be formed, which can review any reported safety or flying standards infractions and take action as required up to and including escalating safety concerns to the competition director. The BGA also has an extensive section on its website on managing flying risks[4] including a section on flying in glider competitions.

Competition flying motivates pilots in ways that can be subconscious. Motivations can be different for different pilots with some enjoying the overall experience, rather than comparing

Footnote

2 https://members.gliding.co.uk/library/safety-briefings/soaring-protocol/ [accessed October 2023].
3 https://members.gliding.co.uk/library/competitions/bga-competition-rules/ [accessed February 2024].
4 https://members.gliding.co.uk/safety/managing-flying-risk-index/ [accessed February 2024].

themselves against others, whilst others are keen to perform well and test themselves. Competitive flying can bring with it an increase in risk with some pilots taking perhaps greater risks than they might do outside of that environment. Pilots may observe such behaviour or actions of other pilots and assess them as safe and acceptable.

Competitions also bring large numbers of gliders together in one area, often flying the same routes and using the same thermals. This means the safety advice contained in the BGA Soaring Protocol is essential risk mitigation for all the pilots.

Midair collision statistics

The investigation analysed all midair collisions that occurred in UK airspace in the period between 2003 and 2023. In this period, 39 collisions between 78 aircraft were identified (a table listing the collisions is provided in Appendix 1), of which 15 involved one or more fatalities to the aircraft occupants. No collisions involved a commercial air transport aircraft, and no person on the ground was injured because of a collision. The types of aircraft involved were identified and divided into the following four categories:

- General Aviation (GA) – A powered aircraft or rotorcraft with a maximum takeoff mass less than 5,700 kg.
- Glider.
- Tug – A light single-engine piston aircraft engaged in aerotowing operations when the collision occurred.
- UAS – An unmanned aerial system, either a model aircraft or a drone.

The collisions were grouped according to the type of aircraft involved (Figure 7). The number of fatalities to aircraft occupants in each collision is listed, as is whether any of the aircraft were involved in a competition at the time.

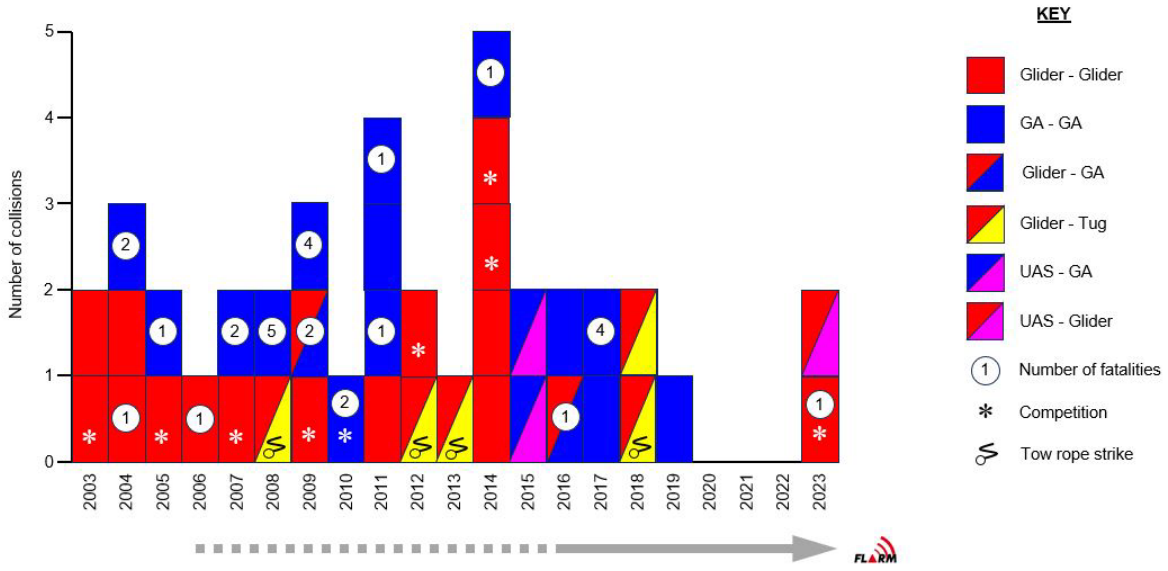

Figure 7

Chart of UK midair collision events, 2003-2023

There were 15 collisions between gliders in the period, three of which involved a fatality. Eight collisions occurred between gliders participating in a competition. Of the 30 gliders involved, 18 landed safely and 12 crashed. Ten pilots were able to parachute to safety following a collision. Analysis of flight recorder files showed that, in 2022, gliding competitions accounted for 8.5% of all glider hours flown in the UK.

The introduction of FLARM to the UK glider fleet began in approximately 2006 and a large proportion of the fleet was equipped by 2016. The collision between G-KADS and G-CLXG was the first collision between gliders to have occurred since 2014. It is only the second collision in the UK known to have occurred where both gliders were equipped with FLARM.

Other information

Pilot experience

Both the pilot of G-CLXG and the pilot of G-KADS had significant experience in gliding and fixed wing flying. Both had flown numerous competitions before and had operated in many different environments.

See and avoid

The primary means of avoiding other aircraft is using the see-and-avoid principle. This relies on the pilot seeing another aircraft, identifying it as a threat or not, and taking action to avoid any conflict if required. In 1991 the Australian Transport Safety Board completed a research study into the limitations of the see and avoid principle.[5] Although the work is over 30 years old, the limitations identified are still applicable today. The report outlined that there are limitations in the human visual and information processing system which can reduce the effectiveness of the process. These limitations are not a lack of skill or effort on behalf of the pilot but reflect the very fact that pilots are human. The BGA also provides a comprehensive summary of the principals and limitations of lookout.[6]

For see and avoid to be an effective barrier to a collision the pilot must 'see' the threat. Seeing the threat can be compromised by the effectiveness of the pilot's visual scan, by the field of view from the cockpit, by how the target stands out against the background, whether the pilot is engaged with other tasks which are taking attention away from the scan, and by psychological factors such as whether the pilot is expecting to see an aircraft in that area. Seeing an aircraft behind you can be challenging as the view may be partially or totally obscured by structure, and it requires a significant physical effort to shift the head and upper body to look effectively behind. Gliders tend to be predominantly white which can provide a poor contrast against a light background such as the sky. Whilst gliders often have large wings in proportion to their size, their wings are often long and thin with the overall effect that gliders often present a small target for others to spot.

Footnote

[5] https://www.atsb.gov.au/publications/1991/limit_see_avoid [accessed November 2023].
[6] https://members.gliding.co.uk/wp-content/uploads/sites/3/2017/08/1-5-LOOKOUT-2017.pdf [accessed November 2023].

Whilst electronic systems such as FLARM can provide the pilot with timely information on collision risks with other equipped aircraft they can only be an aid to a pilot lookout. The BGA states that:

> *'Pilots are reminded that whilst electronic collision warning equipment can enhance pilots' awareness by providing most useful warnings, such equipment cannot and must not replace a good systematic visual lookout scan.'*

Reaction to alerts

It is possible that pilots who experience repeated alerts or alarms from aircraft systems can begin to disregard or pay less attention when they sound even if those alerts are genuine. When a number of gliders are flying around the same area it is possible, especially with the alert level set at low (alerting for low, medium and high threat traffic), that the FLARM alerts and aural tones may be triggered in the cockpit repeatedly. In combination with the possibility of repeated alerts, if the pilot believes that they have the aircraft around them in sight, they may not make use of the information being presented by FLARM inside the cockpit.

Thermalling whilst close to other gliders can generate a high workload for the pilot which can mean that FLARM information is not prioritised. The pilot may be trying to gain altitude, trying to keep the other gliders in sight as well as adjusting the angle of bank to stay in position. The natural constraints of processing capacity within the brain can mean that the pilot awareness of FLARM alerts during periods of high workload is limited.

The pilot can also experience startle when an unexpected FLARM alert sounds in the cockpit especially if this alert is indicating another glider is very close. The pilot may respond rapidly by looking all around for the intruding aircraft without any particular focus on the area being indicated by the FLARM.

Analysis

The pilots of G-KADS and G-CLXG were taking part in a gliding competition. Having flown to the first turning point, both gliders were circling in the same thermal to the south of Melton Mowbray. After a number of turns in the thermal, the two gliders collided with the right wing of G-CLXG severing the tail of G-KADS. The pilot of G-CLXG was able to land his glider in a field nearby but the pilot of G-KADS was fatally injured when the glider struck the ground. Although the pilot of G-KADS was wearing a parachute, there was no attempt to abandon the glider. This could have been due either to the forces on him from the motion of the glider after the tail was lost or if he was rendered unconscious in the collision.

Visual contact

As the two gliders approached the point of collision G-KADS was slightly above G-CXLG and behind. The geometry of this meant that it is likely that neither glider was visible to the other with G-KADS sitting either partially or completely in the rear blind spot of G-CLXG, and G-CLXG sitting in the blind spot below G-KADS. The position of the sun would also

have increased the difficulty for the pilot of G-KADS in seeing G-CLXG as during the final part of the flight G-KADS would have been pointing into the sun with G-CLXG ahead. As both the gliders were white with a small cross section, they may also have been challenging to spot against any white cloud in the vicinity.

Although both aircraft were equipped with FLARM, the alerts did not prevent the two aircraft colliding. FLARM can provide pilots with an excellent picture of the aircraft around them, but it remains an aid to see and avoid rather than the sole source of avoidance.

Competition risk

Competitions provide opportunities for pilots to mix with others within the sport as well as to test their skills within the community. They often place a larger number of gliders within a geographic area than normal flying and this can present a higher risk. Analysis of midair collisions over the period 2003 – 2023 showed that more than half the collisions between gliders occurred during gliding competitions, despite competitions accounting for approximately 10% of the overall gliding activity. The nature of a competition itself can also generate a desire to beat others, which carries with it subtle internal pressure to reduce safety margins more than might be the case in other flying. This pressure can be felt differently by different pilots.

BGA Soaring Protocol

The BGA Soaring Protocol is a document detailing the methods for joining, remaining in and leaving a thermal whilst soaring. The protocol is clear that pilots should never turn inside another glider whilst in a thermal as to do so risks both gliders losing sight of each other and increases the risk of a collision. In this accident, the separation between the gliders reduced due to G-KADS turning inside G-CLXG. It is not possible to know why the pilot of G-KADS did this, or if he lost sight of the other glider before doing so. This, combined with the pilot of G-CLXG starting to reduce his bank angle to leave the thermal, brought the gliders into conflict and the collision occurred.

Collision risk and electronic conspicuity

The introduction of FLARM to the UK glider fleet has coincided with a significant reduction in the number of collisions between gliders, including a nine-year period[7] where no such collisions occurred. Whilst the statistical sample size is small, it is likely that the additional situational awareness provided to glider pilots by FLARM has been a significant factor contributing to the decrease in collisions.

Conclusion

The pilots of G-KADS and G-CLXG were taking part in a gliding competition and had entered a thermal to the south of Melton Mowbray to gain some height. After several turns in the thermal, the pilot of G-KADS increased his rate of turn and started to turn inside G-CLXG. This reduced the separation between the two gliders and the geometry was such that it is

Footnote

[7] 2 September 2014 to 16 August 2023.

likely that neither glider was visible to the other. As G-CLXG then began to reduce his rate of turn to leave the thermal, the two gliders came into conflict as they were at the same height. A collision occurred in which the tail of G-KADS was severed. The pilot of G-KADS was fatally injured when the glider struck the ground.

The BGA Soaring Protocol contains clear guidance on thermalling and the dangers of turning inside another glider, which can reduce the separation between aircraft and the effectiveness of the see-and-avoid principle.

Safety action

The following safety action was taken by the BGA:

- The BGA has updated the *'Managing Flying Risk – Flying in Gliding Competitions'* section of their website.
- The BGA is to deliver a midair collision safety campaign, in the spring of 2024, aimed at pilots taking part in gliding competitions.
- The BGA is monitoring an initiative from FAI[8] International Gliding Commission which is evaluating a 'proximity monitoring tool' for evaluation of logger traces to identify unusually close proximity between gliders, as an aid to post-flight safety debriefs. If the tool proves to be useful, the BGA plans to adopt it for UK gliding competitions.

Footnote

[8] Fédération Aéronautique Internationale, the world governing body for air sports.

Appendix 1

#	Date	Aircraft	Reg	Location	Fatalities	AAIB accident number	Notes
1	11/08/2003	LS4 glider & Libelle glider	BGA4189 & BGA1630	Didcot	0	-	Collision in a thermal at 4,000 ft during competition. Both landed safely.
2	04/09/2003	ASW-27 glider & Discus glider	BGA4338 & BGA4092	Near Lasham	0	-	Collision in a thermal at 3,000 ft. Both pilots baled out.
3	26/04/2004	Skylark 4 glider & Ventus ct glider	BGA1116 & BGA3259	Near Lasham	1	EW/C2004/04/03	Collision at 4,000 ft during local flying. Skylark pilot baled out.
4	06/07/2004	Robinson 22 & Hybred 44XLR	G-LIDS & G-MTJP	Welham Green	2	EW/C2004/07/02	Collision at 1,200ft. Robinson 22 landed safely.
5	22/7/2004	Grob 103C glider & Vega T65C glider	BGA3574 & BGA2716	Lasham	0	-	Collision occurred on final approach, below 300 ft. Both landed safely.
6	18/12/2005	Cessna 152 & Eurostar EV-97	G-BNXC & G-GHEE	Moreton-in-Marsh	1	EW/C2005/12/01	Collision at approximately 1,000 ft. Eurostar landed safely.
7	26/7/2005	ASW-20 & Janus	BGA3419 & BGA4210	Lasham	0	-	Collision prior to task start during a competition. Both landed safely.
8	02/10/2006	ASW-19 & SF-27	BGA3752 & BGA3934	Sutton Bank	1	EW/C2006/10/02	Collision at 1,500 ft during local flying. SF-27 pilot baled out.
9	16/12/2007	Luscombe 8E & PAC750XL	G-AKUI & ZK-KAY	Rugely	2	EW/C2007/12/02	Collision at 2,000 ft. PAC750XL landed safely
10	14/7/2007	DG-600 & ASW-28	BGA4966 & BGA5161	Southam	0	-	Collision in a thermal during competition. Both landed safely.
11	17/08/2008	Cessna 402 & KR-2	G-EYES & G-BOLZ	Coventry	5	EW/C2008/08/05	Collision on approach path at 3 nm. Both aircraft crashed.
12	29/7/2008	PA-18 tug & ASK-21	N/K & N/K	N/K	0	-	Tug aircraft towrope struck K-21 during aerial photography. Both landed safely.
13	11/02/2009	Grob Tutor & Grob Tutor	G-BYVN & G-BYUT	Porthcawl	4	EW/C2009/02/02	Collison at 2,900 ft. Both aircraft crashed.
14	14/06/2009	Grob Tutor & Cirrus glider	G-BYXR & G-CKHT	Benson	2	EW/C2009/06/04	Collision at 4,200 ft. Cirrus pilot baled out.
15	28/7/2009	Antares 18S & Ventus 2ct	D-KAIB & G-EVII	Wittering	0	-	Collision in a thermal during competition. Both landed safely.
16	04/09/2010	Vans RV-4 & Mooney M20J	G-MARX & G-JAST	Isle of Wight	2	EW/C2010/09/01	Collision at 700 ft during an air race. RV-4 landed safely.
17	04/07/2011	Vans RV-6A & Diamond DA-40	G-RVGC & G-CEZR	Shoreham	1	EW/C2011/07/01	Collision in visual circuit at 1,100 ft. DA-40 landed safely.
18	10/07/2011	P-51D & AD-4N Skyraider	D-FBBD & F-AZDP	Duxford	0	EW/C2011/07/02	Collision during airshow 'break' manoeuvre. Skyraider landed safely.
19	18/12/2011	Taylorcraft & Pitts S2C	G-BVXS & G-IICI	Leicester	1	EW/C2011/12/01	Collision in the visual circuit at 1,000 ft. Pitts landed safely.
20	5/8/2011	K-21 glider & K-13 glider	N/K & N/K	Lasham	0	-	Collision in a thermal at 1,200 ft. Both landed safely.
21	23/07/2012	DG-100G glider & LS-7 glider	G-CKMG & G-CGBY	Newmarket	0	-	Collision in a thermal at 2,000 ft during competition. LS-7 landed safely.
22	30/5/2012	Rallye tug & LS-7	N/K & N/K	N/K	0	-	Tug aircraft overflew landing LS-7. Both aircraft landed safely.
23	18/05/2014	Discus glider & Arcus glider	G-CFFT & G-JKRV	Gransden Lodge	0	-	Collision in a thermal at 2,600 ft. Discus pilot baled out.
24	15/07/2014	ASW-19 glider & Mosquito glider	G-DDZG & G-DDUB	Portmoak	0	-	Collision during ridge soaring at between 1,600 and 2,000 ft. ASW-19 pilot baled out.
25	26/07/2014	Discus glider & LAK17 glider	G-IDER & G-CKOI	Little Paxton	0	-	Collision in a thermal at 4,000 ft during competition. Discus pilot baled out.
26	01/09/2014	Grob 103 glider & Cirrus glider	G-CJOG & G-CHRL	Aboyne	0	-	Collision at 4,000 ft prior to task start during a competition. Both Grob 103 pilots baled out.
27	5/10/2013	PA-25 tug & Discus	N/K & N/K	N/K	0	-	Descending tug aircraft towrope struck Discus in a thermal. Both landed safely.
28	23/09/2014	Kitfox & Cessna 177RG	G-TOMZ & G-AZTW	St. Neots	1	EW/C2014/09/03	Collision at 2,700 ft. Cessna landed safely.
29	05/04/2015	Pioneer 300 & model aircraft	G-OPFA & UAS	Upton-on-Severn	0	EW/G2015/04/12	Collision at 630 ft, Pioneer 300 landed safely.
30	30/04/2015	DR400 & model aircraft	F-GSBM & UAS	Shoreham	0	EW/G2015/04/27	Collision in visual circuit between 600-800 ft. DR400 landed safely.
31	30/09/2016	PA-28 & PA-28	G-CCZV & G-BZBS	Near Elstree	0	EW/G2016/09/23	Collision at 2,000 ft. Both landed safely.
32	04/12/2016	Cessna 150L & SZD-51 glider	G-CSFC & G-CLJK	Leicester	1	EW/C2016/12/01	Collision at 2,300 ft. Cessna landed safely.
33	23/09/2017	P-51D & P-51D	G-SHWN & G-BIXL	Duxford	0	EW/C2017/09/05	Collision during airshow formation flight. Both landed safely.
34	17/11/2017	Guimbal G2 & Cessna 152	G-JAMM & G-WACG	Waddesdon	4	EW/C2017/11/02	Collision at 1,030 ft. Both aircraft crashed.
35	08/06/2018	DR400 tug & K21 glider	G-LGCC & G-CFYF	Dunstable	0	EW/G2018/06/07	Collision at 900 ft. Both landed safely.
36	04/08/2018	DR400 tug & SZD-55	N/K & G-CHHR	Dunstable	0	-	Tug aircraft towrope struck SZD-55 canopy. Both landed safely.
37	23/06/2019	Cessna 172 & Fuji FA-200	G-HAMI & G-BXGV	White Waltham	0	AAIB-25830	Collision, both landed safely
38	17/08/2023	Ventus 2cxt glider & Antares E1 glider	G-KADS & G-CLXG	Melton Mowbray	1	AAIB-29483	Collision in a thermal at 2,300 ft during competition. Antares landed safely.
39	07/10/2023	T21 glider & UAS	WB924 & UAS	Dunstable	0	AAIB-29662	Collision at 100 ft during landing, T21 landed safely.

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