Accident

Aircraft Type and Registration:	Guimbal Cabri G2, G-FICH	
No & Type of Engines:	1 Lycoming O-360-J2A piston engine	
Year of Manufacture:	2015 (Serial no: 1131)	
Date & Time (UTC):	27 September 2024 at 1559 hrs	
Location:	Leicester Airport	
Type of Flight:	Training	
Persons on Board:	Crew - 2	Passengers - None
Injuries:	Crew - 1 (Minor)	Passengers - N/A
Nature of Damage:	Rotor blades destroyed and tail boom damage	
Commander's Licence:	Commercial Pilot's Licence	
Commander's Age:	40 years	
Commander's Flying Experience:	314 hours (of which 212 were on type) Last 90 days - 40 hours Last 28 days - 25 hours	
Information Source:	AAIB Field Investigation	

Synopsis

During a period of hovering at the end of an instructional flight, the helicopter began to yaw to the left. This yaw rapidly accelerated and G-FICH completed four rotations before striking the ground. Whilst the commander reported no injuries after the accident, he died seven days later from an unrelated medical condition.

The helicopter examination did not reveal any technical faults that could have caused or contributed to the accident. Evidence from the manufacturer and operator demonstrated that applying and maintaining full opposite pedal will stop rotation in the situation encountered on the accident flight. It is likely that full pedal was not applied and/or not held long enough to effect a recovery.

The helicopter was equipped with adjustable pedals on the right side but not on the left where the commander was sat. The manufacturer has taken safety action to install adjustable pedals in the left seat of all new models of the Cabri G2 as well as to add a pre-flight check of the travel of the fenestron.

History of the flight

The flight was an instructional sortie for a student who had not flown for some time. The commander was sat in the left seat and the student on the right. Having departed Leicester Airport, the commander and student conducted a number of revision exercises at altitude before returning to the airport for some hovering practice. Whilst the helicopter was

moving forward very slowly it began to yaw to the left which was not immediately arrested by either the student or the commander. The yaw to the left continued, increasing in rate with the helicopter completing four rotations before it struck the ground. The helicopter came to rest on its left side and both pilots were able to climb out. The student suffered minor injuries, and the commander reported that he was unhurt.

Four days after the accident, the commander was discovered unresponsive at home and was subsequently found to have suffered a basilar artery thrombosis. This is a blockage of the basilar artery due to a blood clot. The basilar artery is crucial for supplying blood to the brainstem, cerebellum, and posterior part of the brain. The prognosis for such a thrombosis is very poor and the commander died three days later. Medical expertise concluded that although the thrombosis occurred after the accident, it was unrelated.

Accident site

The helicopter came to rest on its left side (Figure 1) close to the location in which it had been hovering. The cabin and cockpit area had minor damage. The main rotor blades were severely damaged, the tail boom had separated, the right door had detached, and the skids had slid sideways to the right. The maintenance organisation attended the accident site and disconnected the tail rotor control rod from the tail rotor control unit, so that the tail boom could be removed to ease transportation of the helicopter back to a hangar for examination.

Figure 1
Accident site

Recorded information

The helicopter was fitted with a GoPro camera, located in the overhead panel, behind the pilots. The camera is powered using its internal battery which is charged using an external battery to ensure it can last all day. It was usually switched on and off manually prior to and after each flight.

Immediately after the accident the operator asked the commander if the camera recording was available to which he replied that it was not. Examination of the camera SD card confirmed that there was sufficient space remaining and that the flight had not been recorded.

CCTV footage of the airport was provided which captured the accident sequence. The helicopter was located to the south of the paved runway (Figure 2).

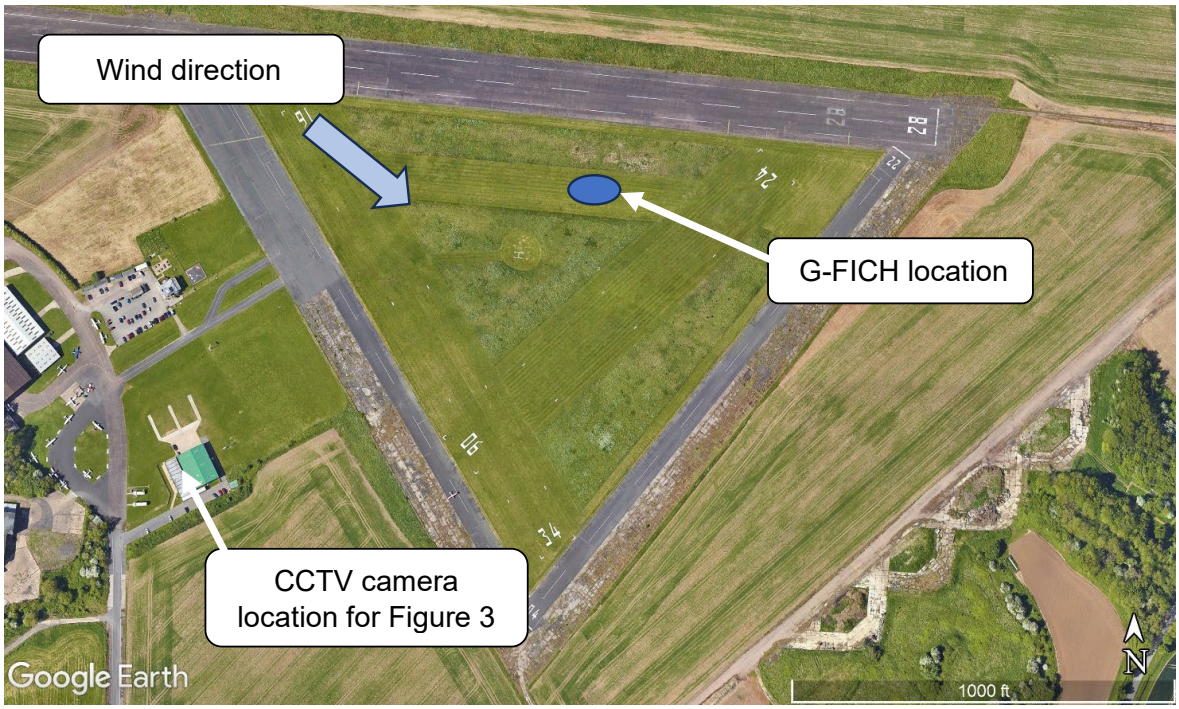

Figure 2

Leicester Airport with approximate helicopter location and Figure 3 camera location

The CCTV showed G-FICH moving forward very slowly as it was brought to a hover approximately into wind. It then yawed rapidly to the left and continued yawing, roughly level in pitch and height for the first rotation. The second rotation saw G-FICH descend closer to the ground, but the helicopter climbed vertically during the third rotation which would likely have been the result of an increase in the collective. The fourth rotation saw G-FICH descend before contact with the ground initially with the rear of the skids and the tail.

Two still images from the CCTV are shown in Figure 3 showing one of the turns to the left prior to striking the ground.

Figure 3

CCTV still images from Leicester Airport

Weather conditions, including the wind speed and direction, were recorded at the airport every five minutes. The recording showed that during the time that G-FICH was back at the airport manoeuvring, the wind was steady from a north westerly direction varying in speed between 16 and 24 kt. There was no cloud below 3,400 ft aal and the visibility was good.

Aircraft information

General

The Guimbal Cabri G2 is a two-seat light helicopter powered by a Lycoming O-360-J2A piston engine. The majority of Cabri G2s sold are used for flying training.

Yaw control

G-FICH was fitted with dual controls with yaw pedals on both sides. The pedals on the right side were adjustable, with two positions, which allows pilots to reduce the distance between

the pedals and seat by 80 mm, by pivoting the top of the pedal aft (Figure 4). The left side had the standard non-adjustable pedals.

The manufacturer initially fitted the helicopter type with non-adjustable pedals on both sides[1], but in 2011 (from Serial Number 1024 onwards) it moved to fitting adjustable pedals on the right side as standard. The adjustable pedals were available for the left side as a factory-fit option or as a more expensive retrofit-option. As a result of the findings of this investigation, the manufacturer plans to install adjustable pedals on the left side as a standard fit on new models.

Figure 4

Left side fixed pedals (left image) and right side adjustable pedals (right image) on G-FICH

The manufacturer does not publish guidance regarding pilot height or the leg length[2] at which it might be appropriate to use the adjustable pedals. Other pilots who flew the helicopter type suggested that a pilot less than around 172 cm tall might find flying with the adjustable pedals more comfortable and find full pedal easier to reach, if the pedals were adjusted to the closest position.

All pilots when they carry out the pre-flight checks, should complete a full and free movement check to assure themselves that they can reach full travel on all the flight controls and they are functioning correctly. They must not only be able to reach full travel but to hold it there.

Footnote

1 The original non-adjustable pedals fitted to the type prior to 2011 were set in an intermediate position when compared to the two positions available with the adjustable pedals.

2 Height or leg length may not be the only anthropometric measures that influence preferred pedal position, but they can provide an overall indication.

The manufacturer is aware of a previous loss of yaw control incident, where an instructor taking control from a student discovered resistance due to the student's feet blocking or slowing the application of a greater amount of pedal. Cockpit footage showed that the helicopter initially continued to rotate until the instructor was able to apply full pedal, after the student had removed their feet from the pedals. Once full pedal was applied and held by the instructor the rotation stopped after 450° and the helicopter was recovered.

Training and manufacturers advice on yaw control

The Cabri G2 is fitted with a fenestron rather than a standard tail rotor. This means that the yaw control surfaces are encased within a shroud. A fenestron has some notable benefits such as decreasing the risk of injury to people walking through the arc of the tail rotor and the blades have some protection from ground or object contact. There are also some well-known disadvantages to a fenestron which pilots must be mindful of when operating.

Extensive testing by the manufacturer has shown that the helicopter type's yaw control is immune from stall or vortex ring states (often known as loss of tail rotor effectiveness). As the speed is reduced on approach to the hover, the Cabri G2 does however require a greater pedal input than a conventional tail rotor design, although the final amount of pedal travel may be similar. In the Cabri G2 this is partly due to the large, aerofoil-shaped vertical fin which is designed to provide stability in yaw during forward flight. Given the main rotor rotates clockwise when seen from above, this fin is also set at an angle of attack to the left, thus producing most of the thrust required in forward flight to counter the main rotor torque. The tail rotor thrust is null when the left pedal is about 3 cm forward (6 cm between the two pedals). As the helicopter slows to the hover the pilot must compensate for the decreasing amount of assistance provided by the fin as well as counteracting the additional yaw generated from increasing main rotor thrust.

The wind direction can also decrease the effectiveness of a fenestron especially if the wind is blowing in towards the air exiting. This can increase the pedal travel required with the wind from the right.

The manufacturer issued Service Letter 12-001 A - *'Yaw control in approach'*[3] in 2012. Although G-FICH was hovering rather than making an approach, the information on yaw control is relevant to the accident. The Service Letter states that there are three factors that can exacerbate the risk of the helicopter yawing left:

> *'If the pilot is surprised by the departure in yaw, he will instinctively raise the collective, thus accelerating the yaw to the left.*
>
> *If the wind comes from the right, and the pilot is slow to react, allowing the helicopter to depart in yaw to the left, the yaw will accelerate as the helicopter's tail passes through the wind due to the windvane effect (can be compared to a jibe).*

Footnote

[3] https://extranet.guimbal.com/link/srYndTZqHFa0lPu [accessed 25 June 2025]

If the helicopter is landing close to IGE[4] hover ceiling, over the transition altitude (3800 ft ISA), full power will be obtained with full throttle (100% FLO on MLI). If collective is increased too much, the rotor speed will decrease, reducing tail rotor thrust and increasing yaw to the left.'

Both the first and second factors applied in the case of G-FICH. The application and maintenance of full pedal has been shown by the manufacturer to stop the rotation.

The manufacturer publishes a Flight Instructors Guide which gives details of the most common flight training exercises and guidance on how they should be carried out. The guidance was developed based on its experience of training pilots and analysis of previous accident reports. The guide includes an exercise in recovery from a high rate of left yaw. The aim of the exercise is to demonstrate the high authority of the tail rotor, for the pilot to appreciate the position of full right pedal and to build a reaction in case of loss of control in yaw to the left. The commander had received training in recovering from high rates of yaw both in the classroom and as part of his airborne instructors training based on the guidance from the manufacturer.

Aircraft examination

The helicopter was examined by the AAIB at the maintenance organisation. The tail rotor driveshaft was bent but free to rotate. The damage to the fenestron shroud indicated that the fenestron had been rotating at impact. The yaw pedals were free to move full right and full left and nothing was found that would have caused a temporary restriction. Actuating the pedals moved the tail rotor control rod that had been disconnected from the tail rotor control unit after the accident. When the tail rotor control unit was actuated, the fenestron blades rotated to their specified positions for full left and right pedal. The tail rotor driveshaft has an adjustable rod eye-end that connects to the tail rotor control unit. As this part had been removed it was not possible to confirm the correct length adjustment. If the length is not adjusted correctly the pedals can reach their stop before the tail rotor control unit reaches its stop.

Engine compression checks did not reveal any issues and there were 72 litres of fuel on board.

Maintenance history

The helicopter was manufactured in 2015 and had accumulated 4,862 hours at the time of the accident. The last 50-hour maintenance check had been completed on 22 September 2024. The only defect noted during this check was the map bag touching the Emergency Locating Transmitter test switch – this was rectified. The last disconnection of the tail rotor control rod was during the 2,200-hour maintenance check which was completed on 25 January 2024. The helicopter had been operated for 465 hours since this maintenance and, according to the flying training school, instructors regularly checked that full yaw travel could be reached by rotating the fenestron blades by hand and checking the travel against the 'shroud marks' on the fenestron shroud during their pre-flight checks (Figure 5).

Footnote

[4] In ground effect.

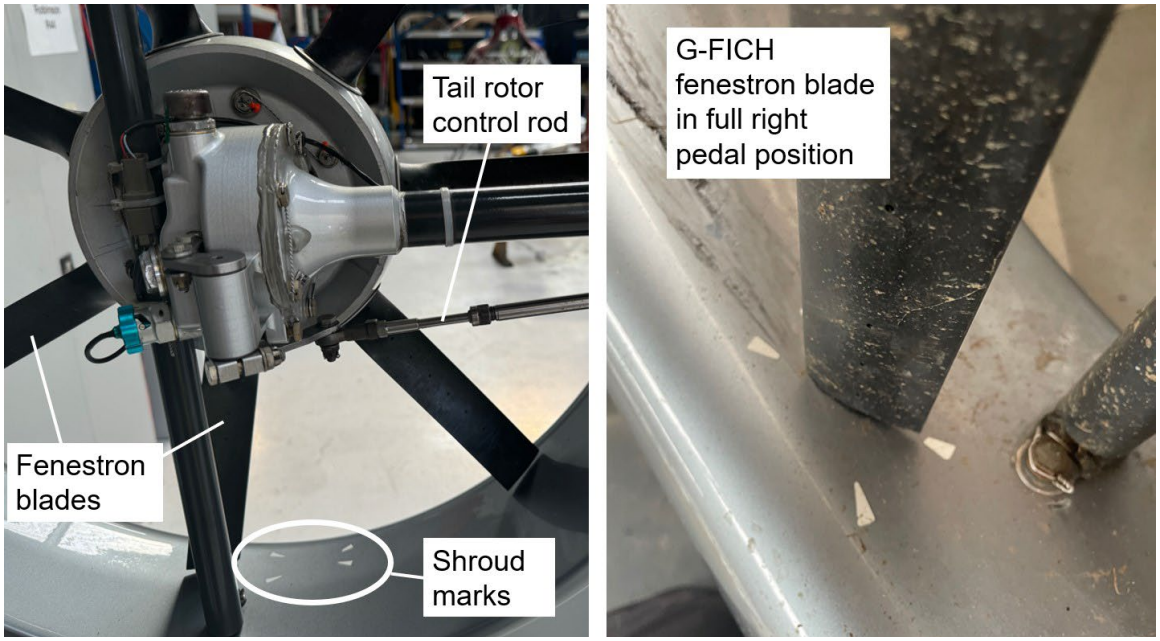

Figure 5

Shroud marks (left image) and fenestron blades aligned with the shroud mark for full right pedal on G-FICH (right image)

The pre-flight check list in the Flight Manual[5] contained a tail rotor blades condition and slack check, but it did not contain a check of the blades against the shroud marks. As a result of the findings of this investigation, the aircraft manufacturer plans to add the following pre-flight check in the next revision of the Flight Manual:

'Tail rotor blades max pitch……Aligned with shroud marks'.

Survivability

Neither occupant of the helicopter was seriously injured in the accident. The student sitting in the right seat reported that he had a sore lower leg, but the commander reported no injuries. The helicopter was fitted with stroking seats and skids designed to absorb vertical deceleration energy but neither mitigated any risk in this accident as the helicopter struck the ground on its side.

Personnel

Commander

The commander was a newly qualified instructor having completed his course and assessment at the beginning of August 2024. He had completed 28 hours of instructing before the accident flight. These instruction sorties covered the PPL (H) syllabus and had included hovering and airfield work. The commander was listed in his CAA medical information as being 169 cm tall[6].

Footnote

[5] Cabri G2 Flight Manual Issue 11.
[6] No other anthropometric data was available to the AAIB for the commander.

During flying training for his UK helicopter licence with the operator, the commander would have flown in the right seat. All of the operator's helicopters of this type had adjustable pedals fitted on the right side but only one had them fitted to both sides. He completed his instructor training at another operator where the helicopter he flew had adjustable pedals fitted on both sides. His instructor during this course commented that the commander preferred to fly with the pedals adjusted so that they were in the position closest to him. It is likely that on returning to the operator once his instructing course was completed, he would then have been flying with the non-adjustable pedals for the first time. Before he began instructing students, the commander completed a check and standardisation flight with the operator's training staff and no difficulties were noted in achieving full pedal travel from the left seat.

In a report submitted to the operator immediately after the accident, the commander recalled that whilst the student was moving forward slowly in the hover, the helicopter started to yaw to the left. The commander recalled taking control as it passed 90° of rotation and applying full right pedal, but this did not stop the yaw. He stated that he raised the collective slightly to keep the helicopter off the ground and attempted to increase the forward speed, but the rotation continued. After four complete rotations the skids touched the ground, and the helicopter rolled over. The commander had also discussed with a third party that the rotation rate increased with each rotation.

Student

The student had commenced his helicopter flying more than two years previously and for various reasons had not flown since July 2022. He was restarting his PPL training, and this flight was a refresher on the lessons completed so far and a chance for him to re-familiarise himself with the helicopter and the flying environment. He had completed 11 hours of flying before the accident flight.

The student recalled that he had completed around ten minutes of hovering exercises on the airfield when the helicopter suddenly yawed to the left. He stated that after the commander took control, he immediately removed his hands and feet from the controls.

Human factors considerations

Although the need for positive yaw control in the helicopter type is well understood and well-practised, if a significant yaw rate suddenly occurs, for whatever reason, it can lead to a delayed or insufficient reaction from a pilot who is not expecting it. The unexpected onset of an event such as a movement in a control axis can surprise[7] or startle[8] a pilot.

The helicopter completed four 360° rotations in less than 10 seconds with the rate of rotation increasing with each one. The manufacturer includes advice to pilots in a Service Letter that high rates of rotation '*can be very uncomfortable and disorienting for the pilot, and thus very dangerous at low height.'*

Footnote

[7] An emotional and cognitive response to unexpected events that are difficult to explain, forcing a person to change his or her understanding of the problem.

[8] A complex, involuntary reaction to a sudden unanticipated stimulus.

A pilot may often use complex motor programmes[9] to fly, just as a driver does for a road vehicle. These programmes are developed by repetition until they require little conscious thought. The commander had done almost all his flying on the helicopter type with adjustable pedals and flew with those pedals in the position closest to him. This would have meant his motor programmes for yaw control were probably based on foot positions used with the adjustable pedals in the closer position rather than those required in the left seat of G-FICH.

Other information

The operator conducted a flight using two qualified instructors in the same model of helicopter as G-FICH. This flight followed the guidance given in the Flight Instructors Guide for demonstrating recovery from high rates of left yaw. They allowed the helicopter to yaw left up to 360° by reducing the right pedal input whilst in the hover. Then full right pedal was applied to stop the rotation. The operator found that the rotation would stop within 40-50°, even after a complete 360° rotation. The manufacturer does not recommend allowing more than one complete rotation before recovery is commenced during training. Both instructors commented that the rotation was disorientating.

Analysis

The helicopter examination did not reveal any technical faults that could have caused or contributed to the accident. If the tail rotor control rod had been adjusted incorrectly it is likely that this would have been detected during a pre-flight check in the preceding nine months.

The reason the helicopter departed in yaw during the final stages of the flight was not established. It is possible that the increasing departure in yaw may have been made more likely by a handover of control to the commander, particularly if insufficient pedal had been applied to stop the helicopter continuing to yaw to the left. The wind direction would then have exacerbated the yaw as would any increase in collective pitch.

Full pedal travel was available to the commander, and flight trials by the manufacturer have shown that applying and maintaining full pedal will stop the rotation. The manufacturer has previously seen events where one pilot can accidently block the application of full pedal by the other pilot, but the student stated that he had immediately removed his feet from the pedals as soon as the commander had taken control. The commander may have inadvertently not applied full pedal, either due to a lack of familiarity with the full pedal position on the non-adjustable pedals, or because he could not easily achieve full right pedal in a natural position. It may also be that he applied full pedal but did not maintain it long enough to stop the rotation.

The yaw occurred rapidly and unexpectedly close to the ground. This could have startled the pilot which may have delayed the application of full pedal. The rate of rotation was also rapid which would have been disorienting, causing further challenges for any recovery.

Footnote

[9] A set of co-ordinated movements and actions for completing a task that do not rely on conscious thought and feedback.

It was not determined why the accident flight was not recorded on the GoPro camera. While there was no requirement for the camera to be fitted to the helicopter, the operator had done so because it recognised the benefit of using recordings as a debriefing tool. Had a recording of the accident flight been available, it would have assisted the investigation in determining the cause of the accident.

Conclusion

Yaw control of G-FICH was lost during a hovering exercise. It is likely that full opposite pedal was not applied and/or held for sufficient time. This may have been because the commander was more familiar with flying using the adjustable pedals than those fitted on the left side of G-FICH. Whilst the commander was not injured in the accident, he died from an unrelated medical condition seven days later.

Safety actions

The aircraft manufacturer has agreed to install adjustable pedals on the left side as a standard fit on new models of Cabri G2.

The aircraft manufacturer has stated that it will amend the pre-flight checklist in the next revision of the Flight Manual to include a check that the tail rotor blades can be aligned with the fenestron shroud marks.

Published: 17 July 2025.