

ACCIDENT

Aircraft Type and Registration:	1) Robinson R44 Raven, G-CTFL 2) Robinson R44 Raven, G-HYND
No & Type of Engines:	1) 1 Lycoming O-540-F1B5 Piston Engine 2) 1 Lycoming O-540-F1B5 Piston Engine
Year of Manufacture:	1) 2008 (Serial no: 1912) 2) 2016 (Serial no: 2433)
Date & Time (UTC):	5 May 2018 at 1125 hrs
Location:	Cumbernauld Airport, North Lanarkshire
Type of Flight:	1) Training 2) Training
Persons on Board:	1) Crew - 1 Passengers - 2 2) Crew - 1 Passengers - 3
Injuries:	1) Crew - None Passengers - None 2) Crew - None Passengers - None
Nature of Damage:	1) Extensive 2) Main rotor blade damaged
Commander's Licence:	1) Commercial Pilot's Licence 2) Commercial Pilot's Licence
Commander's Age:	1) 42 years 2) 58 years
Commander's Flying Experience:	1) 913 hours (of which 226 were on type) Last 90 days - 54 hours Last 28 days - 21 hours 2) 6,846 hours (of which 1,705 were on type) Last 90 days - 62 hours Last 28 days - 13 hours
Information Source:	Aircraft Accident Report Forms submitted by the pilots, recorded CCTV and radio transmissions and further enquiries by the AAIB

Synopsis

After lifting to a hover, the pilot of Robinson R44, G-CTFL reversed his helicopter, unaware that a second Robinson R44, G-HYND, had landed behind his position and was being shut down. One of G-HYND's rotor blades collided with G-CTFL's engine housing, startling the pilot of G-CTFL, with the result that he lost control, and the helicopter struck the ground several times before coming to rest in a tail-down attitude, next to a parked Robinson R22. Safety action has been taken by the helicopter operator to improve the helipad arrangement, procedures and RFFS response.

History of the flight

Robinson R44 G-CTFL had its rotors turning, prior to departing Cumbernauld for a trial lesson flight, when another helicopter of the same type, G-HYND, returned from a sightseeing flight. Because both helipads at the eastern end of the airport were occupied, the pilot of G-HYND landed on a grass area behind G-CTFL and then stated on the Air/Ground radio frequency “GOLF NOVEMBER DELTA SECURE ON THE GROUND COMPLETE”.

The helicopter on the northern of the two helipads was a Robinson R22, which had recently flown and, shortly after G-HYND landed, the crew of the R22 walked in front of G-CTFL towards the helicopter operator’s buildings. It was evident from recordings of the Air/Ground radio frequency that, one minute after the last radio transmission from G-HYND, the pilot of G-CTFL obtained the latest airfield information, but he was not alerted to the presence of another R44 which was parked on the grass. After acknowledging the airfield information, the pilot of G-CTFL announced “GOLF FOXTROT LIMA LIFTING FROM THE EASTERN HELIPAD TO ALPHA”.

The pilot of G-CTFL stated that he was restricted from moving forwards and right onto Taxiway A, because of the position of the parked R22 helicopter and because of a stationary Cessna aircraft, which was in front of him and facing away with its propeller turning (Figure 1). There was a second light aircraft parked to the left of the Cessna and he did not wish to disturb these aircraft with his helicopter’s downwash. The pilot knew that, when he boarded his helicopter, the area to the rear was clear and he had no recollection of hearing any radio transmissions from G-HYND, so he was not aware of its position and was not expecting another helicopter to be parked there. After lifting to the hover, the pilot decided to move rearwards and then taxi behind the R22. He did not turn his helicopter to check that the area to his rear was clear before reversing, because of the proximity of the R22 on his right and because he did not wish to turn his tail left towards the buildings, where some spectators had assembled.

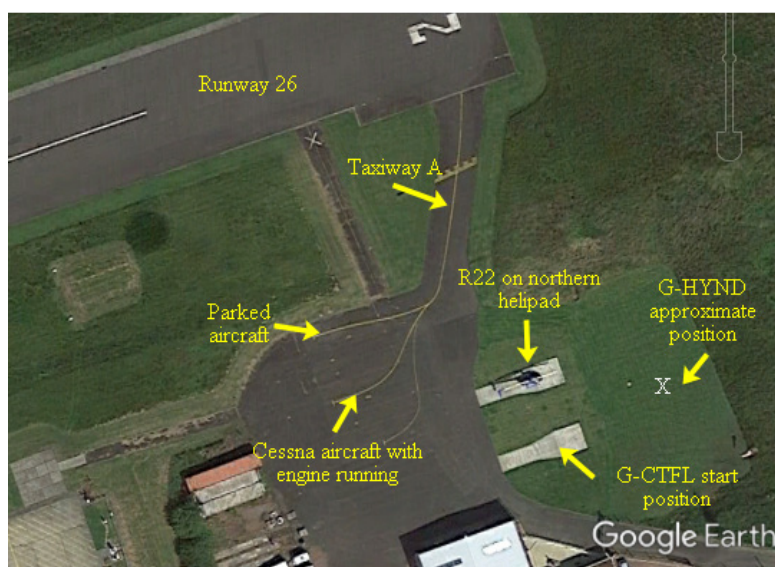


Figure 1

Approximate aircraft disposition in the vicinity of Apron A, at the eastern end of Cumbernauld Airport, before G-CTFL moved

CCTV recordings showed that G-CTFL lifted before moving slowly rearwards and slightly to the right, with its skids approximately 6 ft above the ground. The main rotor blades of G-HYND were still turning slowly and, as G-CTFL approached, one of them struck the engine housing of the hovering helicopter, below the tailboom on the left side.

The pilot of G-CTFL heard a bang and recalled that his helicopter pitched nose-up and right, so he made a forward cyclic control input to return towards the helipad and lowered the collective lever. He then realised the helicopter was pitching nose-down so he moved the cyclic stick aft, but the tail struck the ground, before the helicopter bounced forward off its skids, towards the R22. The pilot stated that he reacted by making a left cyclic stick input, but that the rotor blades then struck the ground and the helicopter vibrated violently, so he lowered the collective lever fully. G-CTFL landed heavily in a nose-up attitude, near the R22, with its tail resting on the ground (Figure 2).

After the helicopter stopped moving, the pilot made the engine and electric switches safe, applied the rotor brake and vacated using his door on the left side. Another of the helicopter operator's employees approached the right side of the helicopter, opened the doors and helped the student pilot and the passenger to escape.



Figure 2

G-CTFL after the accident, facing towards Apron A, with the R22 visible behind, on the northern helipad, and with loose debris in the foreground

The pilot of G-HYND had turned off his radio and had removed his headset while his rotor blades slowed. After writing post-flight notes, he looked up and saw G-CTFL moving towards him. He attempted to turn his radio on and replace his headset, so that he could warn the other pilot but, before achieving this, he observed one of his rotor blades strike the left side of G-CTFL's engine bay. The impact did not seem to affect his own helicopter and his passengers appeared uninjured so, when the rotor blades stopped rotating, they all disembarked normally.

CCTV recordings of the collision showed that G-CTFL pitched rapidly to approximately 45° nose-down but initially maintained its height above the ground, while moving away from

G-HYND, and towards the helipad. As it approached the pad it descended and the nose pitched up, the tail struck the grass and the rear of both skids hit the concrete. This caused G-CTFL to bounce approximately two feet from the ground, into a nose-down attitude, while the tail turned anti-clockwise towards the R22. Next, G-CTFL impacted the ground heavily, orientated at 90° to the pad, with the left skid hitting first and the helicopter then rolling onto its right skid and pitching nose-up until the tail struck the ground near the R22. G-CTFL now bounced a second time, its tail turned quickly clockwise and the helicopter rolled left until the main rotor blades struck the concrete pad. Finally, G-CTFL struck the ground between the two landing pads with its tail on the grass and close to the R22. The rotor blades stopped turning 33 seconds later.

During the accident sequence, the CCTV recording showed debris being thrown several metres across the surrounding area, with some falling onto Apron A. Approximately three minutes after the accident, the pilot of the Cessna aircraft taxied via Taxiway A to another position at the airport, for refuelling, after advising the Air/Ground operator of his intention.

The Cessna's pilot later recalled that he was aware the helicopter's "undercarriage" had collapsed but he did not observe the accident or see any debris, so had not considered the potential for his aircraft to have been damaged. With hindsight, he realised that he could have shut down and inspected his aircraft but, as he was not departing for a flight, he thought that with the situation under control, it would be best if he moved away. He assumed the taxiway was safe to use, as he had watched a Rescue and Fire Fighting Services (RFFS) vehicle being driven along it before he taxied.

RFFS response

The operator of Cumbernauld Airport had agreed that the helicopter operator would provide RFFS in respect of all associated helicopter operations and consequently the helicopter operator's own RFFS vehicle was available. This was situated outside the hangar, a few metres from the accident site, but the only trained RFFS personnel available were the pilots from the R22 and from G-HYND. Another employee was the first to reach the accident site and he saw no evidence of leaking fuel when he assisted the passengers to escape. Subsequently the R22 pilot reached the scene and determined there was no fire risk, so the operator's RFFS vehicle was not employed.

The airport's Air/Ground radio operator activated the airport crash alarm. He was also trained for RFFS duties and, when he did not see the helicopter operator's RFFS vehicle deploy, he passed his radio task to somebody else, and drove the airport's RFFS vehicle to the accident site. He estimated that he arrived within two minutes of the accident, to find that the helicopter's occupants had escaped, without injury, and that the helicopter operator did not believe there was a fire risk, so the local emergency services were not alerted.

Helicopter operator's investigation

The helicopter operator conducted an internal investigation which concluded that the accident could have been avoided if the pilot of G-CTFL had turned the tail of his aircraft and visually checked the area behind. The operator considers such a lookout turn to be a

standard procedure before a helicopter is moved rearwards, but the pilot felt constrained from moving the tail of his helicopter left by the presence of spectators. However, the CCTV recordings showed nobody on the roadway or grass area immediately to the left of G-CTFL and the helicopter operator believed the tail could have been moved left, leaving a 5 m safety margin from any people or obstructions.

According to the helicopter operator, it was not unusual for helicopters to reverse from the southern helipad, if the other pad was occupied and Apron A congested.

The helicopter operator reported that its checklist for the R44 shutdown procedure does not clearly specify when the avionics should be switched off, so it was not unusual that the pilot of G-HYND had switched the radio off and removed his headset once the engine had stopped but with the rotors still turning.

Helicopter operator's safety actions

As a result of the accident, the following safety actions have been taken by the helicopter operator:

- The northern helipad was extended eastwards by 12 m, so a parked helicopter is further from the apron, leaving space for other helicopters to move between the parked helicopter and the apron.
- The prepared grass area east of the helipads has been extended, to ensure helicopters parked there can remain well clear of the pads.
- A mirror has been placed at the corner of the hangar, to assist pilots using either helipad see any activity to their rear.
- The helicopter operator no longer permits helicopters to reverse from the helipads.
- The helicopter operator's safety team is due to review the procedure for turning off the avionics systems while a Robinson R44 is being shut down.
- A review of the RFFS response to this accident has led to several changes being instigated. These are intended to ensure that two appropriately trained employees are available, on the ground, at all times there is helicopter activity and that fire-fighting equipment can be readily accessed by these employees.

Airport operator's report

An investigation by the airport operator established that immediately after the accident it would have been best to close the airport until appropriate inspections of the manoeuvring area and Apron A had been completed.

Scrutiny of the airport's emergency procedures following this accident highlighted some ambiguities and the operator undertook to review and revise the relevant guidance as necessary.

AAIB comment

The collision between the two helicopters occurred because the pilot of G-CTFL was not aware of G-HYND's position. However, the damage to G-CTFL did not appear to immediately effect the operation of its engine or flying controls. The pilot of G-CTFL stated that he recalled his helicopter pitching nose-up and he made a forward cyclic input in response, but CCTV showed that after hitting G-HYND's rotor blade, G-CTFL pitched nose-down. An excessive nose-down attitude ensued, close to the ground, before recovery action appears to have been initiated and the nose began to pitch up. However, the helicopter was now descending towards the helipad and, as the nose pitched up, the tail struck the ground and initiated the impact sequence.

It is likely that the pilot of G-CTFL was startled by the unexpected collision with the other helicopter. The 'startle effect'¹ is likely to have impaired his ability to comprehend the situation and also his psychomotor skills, leading to his loss of control.

When the helicopter operator's employees responded to the accident they did not take any fire fighting equipment to the scene, so it was fortuitous that there was no outbreak of fire before all the helicopters' occupants escaped. As a result, emergency response procedures have been changed, but this accident highlights the need to regularly review such procedures.

Footnote

¹ Startle is defined in the Federal Aviation Authority's Advisory Circular 120-111 of 2015 as '*an uncontrollable, automatic muscle reflex, raised heart rate, blood pressure, etc., elicited by exposure to a sudden, intense event that violates a pilot's expectations.*' An overview of the 'startle effect' and details of reference material can be found on the SKYbrary website at https://www.skybrary.aero/index.php/Startle_Effect (accessed September 2018)