

No: 12/90

Ref: EW/C1177

Category: 2c

**Aircraft Type
and Registration:**

Schweizer 300C (Hughes 269), G-BRNR

No & Type of Engines: 1 Lycoming HIO-360-D1A piston engine

Year of Manufacture: 1989

Date and Time (UTC): 28 September 1990 at 1858 hrs

Location: Oxford (Kidlington) Aerodrome

Type of flight: Commercial (Training)

Persons on Board: Crew - 1 Passengers - 1

Injuries: Crew - 1 (minor) Passengers - None

Nature of Damage: Fire damage to cockpit, tail rotor detached, tail rotor gearbox fractured

Commander's Licence: Airline Transport Pilot's Licence (H) with Instructor rating

Commander's Age: 52 years

**Commander's Total
Flying Experience:**

Approximately 19,000 hours rotary wing (of which approximately 6,000 were on type) and 1,000 hours fixed wing

Information Source: AAIB Field Investigation.

The purpose of the flight was to demonstrate to the passenger the effectiveness of the parachute pyrotechnic flares required to be carried on single-engined helicopters during night flying for ground illumination in the event of a forced landing. The passenger, a qualified balloonist, was the holder of a Private Pilot's Licence (Helicopters) that included a Type Rating for the Schweizer 300C but no Night Rating.

In common with other types of single-engined helicopter, the aircraft was fitted with a permanent installation capable of accepting two flares. The installation was attached to a member beneath and external to the cabin, and the flares could be individually fired by cockpit switch operation in the event of a night forced-landing. It was intended to fire two flares over the airfield from a position where they would remain within the airfield boundary, with the Airfield Fire Service standing by to deal with any problems that could be caused should a flare descend to the ground still burning.

The aircraft, fitted with dual controls, took-off after dark and the commander successively fired the two flares, without difficulty. The passenger then requested the commander, who was in the right seat, to fire a hand-held pyrotechnic parachute flare, for comparison. The flare comprised a cylinder from which a rocket-propelled projectile could be fired, deploying into a high luminosity flare suspended

under a small parachute. Removal of a plastic cap on each end of the cylinder exposed the bore of the firing tube at one end and the firing mechanism at the other. The firing mechanism consisted of a trigger that could be pivoted to the firing position after a safety pin had been removed. An arrow printed on the cylinder indicated the direction of deployment of the projectile from the cylinder.

With the helicopter at around 1000 feet above the airfield, the commander removed the end caps and safety pin, opened the cabin right door and operated the trigger, but inadvertently with the cylinder reversed. The projectile rocketed around the cabin and came to rest on the floor in the forward right corner of the cabin, with the flare generating intense light, a large plume of flame and considerable smoke. Following abortive attempts to jettison the flare out of the doorway, the commander wedged the right door open against the external airflow with his foot and the passenger opened the left door and held it open with his elbow. The commander, subjected to burns from the flare and with a plume of flame snaking up in front of him and out of the right doorway towards the main fuel tank, suffered an almost complete loss of visual references as a result of the intense light and smoke, and because of soot deposits on the transparencies. He established that the passenger, located in a somewhat better environment and shielded by the central instrument console, could still see outside, and passed control to him.

The passenger attempted a run-on landing on the airfield, but did not manage to level the helicopter and it touched down in a nose-high attitude. The tail sting was bent upwards by the ground contact and the tail rotor contacted the ground, causing the blades to detach and the tail rotor gearbox casing to fracture. The aircraft came to rest, on its skids, an estimated 1 minute after the firing of the flare, and the occupants were able to evacuate rapidly. Almost coincident with touchdown the flare extinguished itself. The Fire Service was almost immediately in attendance and extinguished a few small flames remaining in the vicinity of the flare.

The pilot suffered generally surface burns to his hands and legs; the passenger was uninjured. The forward right transparency, the cabin floor panel, the instrument console and the right seat were fire damaged.