

**No:** 9/90

**Ref:** EW/C1170

**Category:** 2c

**Aircraft Type  
and Registration:**

Bell 206 B III Jet Ranger, G-PATW

**No & Type of Engines:** One Allison 250-C20B turboshaft engine

**Year of Manufacture:** 1978

**Date and Time (UTC):** 13 July 1990 at 0940 hrs

**Location:** Kip Hill, near Stanley, County Durham

**Type of Flight:** Private (pleasure)

**Persons on Board:** Crew - 1 Passengers - 1

**Injuries:** Crew - 1 (fatal) Passengers - 1 (fatal)

**Nature of Damage:** Helicopter destroyed

**Commander's Licence:** Private Pilot's Licence

**Commander's Age:** 50 years

**Commander's Total  
Flying Experience:** 115 hours (of which approximately 80 were on type)

**Information Source:** AAIB Field Investigation

The helicopter, which was owned by the pilot, had been parked on the front lawn of an hotel adjacent to the accident site and the pilot had expressed his intention to fly, with his wife, to Oxford on the morning during which the accident occurred. Consequently, the pilot carried out the pre-start and pre-take-off checks upon the helicopter and took off, with his wife in the left front seat, slightly before 0940 hours. The weather at this time is reported as having been CAVOK with an easterly wind of about 10 kt.

Directly in front of the hotel, which faces southeast, is a 110m wide field which slopes upwards fairly sharply from the hotel and, half way up the slope, a triple set of 20,000 volt power cables runs directly across the field, supported by 'telegraph' poles situated at each side of the field. The pole on the north side of the field was obscured by trees and that on the south was silhouetted against distant buildings. The three 8mm thick copper cables had oxidised to a green colour which blended into the green field behind. Near the top of the slope, a tractor was being driven by a man known to the pilot and his wife.

The helicopter had been parked side-on to the hotel and, as it took off, it turned south eastwards and climbed away from the hotel towards the field, crossing over a (different) set of cables at the bottom of the field. It was then seen to fly towards the rising ground in the general direction of the tractor on a heading of approximately 170°. About 150m into the field, it struck the cables. There was a bright flash followed by a loud report and the helicopter began to pitch severely whilst climbing slightly and

moving onwards up the slope. A second or two later, its tail rotor assembly fell to the ground and the helicopter began to rotate anticlockwise whilst continuing to travel towards the tractor. It passed directly over the tractor, leaving a length of cable straddling the bonnet, and fell to the ground 10m beyond it, some 400m from its take off point, where it burst into flames.

Although witness evidence as to the final manoeuvre varies greatly, evidence provided by the ground marks and structural deformation of the helicopter show that it struck the ground hard, in a nose high attitude, banked slightly to the left on a heading of approximately  $280^\circ$  and with negligible forward speed but with some left drift. The main rotor struck the ground and separated from the rotor mast and the helicopter rolled violently to the left and pitched nose down, striking the ground hard on the left forward side of the fuselage and rolling inverted. A severe fire developed which destroyed most of the cabin structure and the main gearbox casing.

Considerable amounts of perspex debris were found in a region extending from beneath the cables forward for a distance of approximately 40m up the slope in the direction of travel, beyond which were found fragments of tail rotor drive shaft, drive shaft cover, the OAT gauge, and more fragments of perspex from the cockpit. The aft section of tail boom together with the tail rotor vertical stabiliser was lying approximately 100m forward of the line of cables, some 50m before the main wreckage impact point.

The skids had broken up in the impact and were lying in, or nearby, the main wreckage. The remains of the forward left skid tube had a cable still wrapped around it and the right forward skid displayed clear evidence that cables had become wrapped around that also. A separate cable was wrapped several times around the lower section of the main rotor mast in the region of the swash plate. Detailed examination of the perspex debris from the early part of the wreckage trail revealed score marks consistent with cable scrapes, and the bezel of the OAT gauge was lightly dented and had a greenish deposit on the surface of the dent. Both the size of the dent and the nature of the green deposit were entirely consistent with the the dimensions and surface corrosion observed on the power cables. The gauge is located on the upper windscreen with the face and bezel on the inside of the windscreen panel, and the position of the dent on the gauge indicated that the windscreen had been broken by a tightly stretched cable running over it.

The three power cables were supported on wooden poles. Cross arms supported the lower pair of cables with a horizontal separation of approximately 1.4m. The third cable was set mid way between the lower pair of cables, approximately 0.7m above them, carried on a vertical extension of the main pole. The height of the lower pair of cables above the ground was approximately 8.5m at the poles, and the cable sag at mid span would have been of the order of 1.8m, giving a local height above ground at the point where the aircraft struck the cables of around 6m to 7m. All three cables were broken by the aircraft whilst it was still airborne. The breaking load of each cable was approximately 2800lb force.

There was no evidence of cable fouls on the remains of the control rods connecting the main rotor blade pitch arms to the swash plate. The cable remains wrapped around the main rotor mast had become

trapped in the swash plate and pitch control mechanism, locally crushing the cable. The lower pitch control rods between the hydraulic power actuators and the swash plate were destroyed by the post-impact fire and it was not possible to establish whether the cable had interfered significantly in the control of the main rotor.

There was no evidence that cables had contacted the tail boom or tail rotor. The tail boom had been severed cleanly by a main rotor strike just aft of the horizontal stabiliser. Witness marks on the outboard section of one main rotor blade exactly matched a fragment of tail boom structure recovered from the area between the cables and the point on the ground where the separated tail section was found, indicating that the main blade strike occurred shortly after the helicopter had hit the wires. At the time the tail was severed, the main rotor had flapped down to an angle of 20° relative to the tail boom horizontal axis.

The pattern of cable damage was consistent with the aircraft picking up the lower pair of cables on the skids, and the third (centre) cable riding up over the nose. The relative geometry between the helicopter skids, nose section, and the cables indicated that the aircraft was flying approximately horizontally in a nose down attitude, consistent with it having been in level accelerating flight at the time it struck the cables. The lower cables were held in place between the skid tubes, the forward skid supports, and the footsteps, and the upper cable lodged in the region of the bottom of the main rotor mast. The cables evidently provided a balanced decelerating force which tended to maintain the aircraft in a level attitude until the cables started to break.

The fact that the aircraft had broken (not cut) all three cables and thereafter continued to fly in a semi-climbing flightpath indicates that the aircraft had considerable kinetic energy at the time the wires were struck, and that the engine was delivering adequate power.

No evidence was found of any pre-accident defect or malfunction.

The C of A was valid and no significant defects were recorded in the Technical Log.