

No: 8/92 **Ref:** EW/C92/5/2 **Category:** 2c

Aircraft Type and Registration: Bell 206B Jetranger III, G-COWZ
No & Type of Engines: 1 Allison 250-C20 turboshaft engine
Year of Manufacture: 1975
Date & Time (UTC): 8 May 1992 at about 1020 hrs
Location: Near Carn Odhar peak in the Grampian Mountains
Type of Flight: Public Transport
Persons on Board: Crew - 1 Passengers - 3
Injuries: Crew - None Passengers - None
Nature of Damage: Damage beyond economic repair
Commander's Licence: Airline Transport Pilot's Licence (Helicopter)
Commander's Age: 28 years
Commander's Flying Experience: 2,586 hours (of which 618 were on type)
Information Source: AAIB Field Investigation

History of Flight

The aircraft was based on private property at Old Rayne, Aberdeenshire. It had been refuelled to full and took off at 0840 hrs to fly to Tomintoul to pick up three passengers. Departure from Tomintoul was at about 0930 hrs for a direct flight to Drumnadrochit, on the west side of Loch Ness. The commander reported that, when he had been airborne for about 15 minutes he encountered an extensive area of cloud from which precipitation in the form of snow was falling. He considered the possibility of flying round the storm but decided to land in a suitable area, on a hillside, and wait for it to pass. The aircraft, which had only flown in the edge of the storm for less than a minute, was shut down and the rotor blade tied down. The snow storm passed after about 10 to 15 minutes and the commander carried out an external check; he noted that there was a light covering of snow on the lower quarter of the windscreen but the particle separator intake and the rest of the airframe appeared to be clear. He did not inspect the intake area which is visible through two perspex inspection windows on the engine cowl. As he got airborne again the commander noted that the snow on the windscreen cleared almost immediately. The aircraft was then flown, in clear sky, at about 2,000 feet amsl and 100 kt IAS.

The commander estimated that he had been airborne for about 10 minutes when the engine flamed out and the 'engine out' audio warning sounded; the aircraft was now about 8 miles from the point of lift off, over mountainous terrain. The commander considered that a standard autorotative landing would have put the aircraft onto steeply sloping ground; he turned right towards a more suitable site, lowered the collective lever slightly and maintained the forward speed, with a relatively high rate of descent. The 'low rotor rpm' audio sounded and, initially, the height above the ground remained constant at about 300 feet because of a steep down slope. Just above the selected landing area the commander flared the aircraft and raised the collective lever fully; it struck the ground firmly and bounced. On the subsequent impact the right skid bogged down in the soft ground and the aircraft came to rest on its right side. The rear seat occupants escaped through the left cabin door and assisted the two front seat occupants. The former wore lap belt only restraint and the latter full harness; no injuries were sustained.

An aftercast was prepared by the Meteorological Office at Bracknell. At 1000 hrs a polar low pressure area was situated about 90 nm to the north-north-west of Cape Wrath. It was moving quickly eastwards but maintained a very strong, unstable, westerly airstream over the Grampians. There were frequent showers of rain, hail and snow. The wind at 2,000 feet was 280°/45 kt, the temperature +1° Celsius with a relative humidity of 65 %.

Examination of Aircraft

The aircraft lay at about 1,900 feet in hilly terrain 20 km south-south-east of Inverness. The tailboom had broken off on impact and though the main rotor blades were damaged and broken they showed evidence of only low rotational speed. The landing skid supports had bent slightly in the initial impact and the airframe structure to which they were attached had been crushed locally. The main gearbox had tipped forward during the landing, the input drive had been ruptured and some damage had been caused to the cabin roof structure.

Immediately after the accident fuel was seen to be draining from the tank vent in the fuselage aft underside and before the aircraft could be airlifted out more fuel had to be drained from the tank and was lost. An on-site examination of the engine before salvage showed no external signs of distress and no loose or broken fuel or air pipes. The engine anti-icing, which provides hot air to the compressor entry casing, was switched 'ON' and the Fuel Control Unit (FCU) input lever was found to be at 'MAXIMUM', the normal flight position.

The aircraft was recovered from the site and examined. A more complete examination of the engine's exterior found no defects or failures. A fuel sample was recovered from the tank and fuel was found

in the engine lines at the engine driven pump and at delivery to the engine fuel nozzle. The airframe fuel filter was full of fuel and all these samples were found to be clear of contamination and analysis showed that they conformed to the JET-A1 specification. (One discrepancy was found in that the samples did fail the water reaction check, ie their ability to separate out water was unsatisfactory, but there was no water contamination in the fuel and it is thought that this was caused by the sample jars, though dry, having some traces of detergent on them.) The LP fuel cock switch was found in the 'ON', guarded, position and the valve itself was confirmed to be open. No leakage or restriction was found in the airframe fuel system and eventually fuel was added to the tank and a satisfactory flow achieved through the aircraft system using the aircraft's boost pumps.

The air intake and particle separator showed no signs of blockage or contamination (The aircraft was fitted with a particle separator but did not have snow baffles). The engine's first stage compressor blades were soiled as from normal atmospheric contamination; in one or two cases where an engine of this type has flamed out due to suspected snow or soft ice ingestion it has been noticed that the first stage blades appeared 'washed' but that was not the case here.

The engine was removed and taken to an agent for examination and testing. Both rotational assemblies were found to be free to rotate, with a possible slight rub in the gas producer, and their associated drives were intact. The combustion casing was removed and it was found that, though the combustion area was otherwise in good condition, the first stage nozzle guide vanes were burned and cracked over one sector of about 40 degrees. The compressor casing was opened and the compressor was found to be intact though it was dirty and there were cracks in the plastic lining. A functional test run was carried out successfully, including operation with anti-icing 'ON', and inspections carried out when the engine was running found no signs of external leaks from the engine or its pipework.

Coincidentally, the Aviation Safety Promotion Branch of Transport Canada published in their periodical 'Aviation Safety Maintainer', issue 2/92, a report of a Bell 206B suffering a flame-out while turning around in the edge of a heavy rain shower. The cause of the flame-out could not be determined but the FCU Pr-Pg valve was found to be contaminated with dirt and a 'white' grease resulting in some internal leakage and the Power Turbine Governor input lever and eccentric shaft cam lever were stiff almost to the point of sticking. These components were examined on the engine from G-COWZ but no similar conditions were found.