

Bell 206B Jetranger III, G-OCBB, 9 November 1998 at 1550 hrs

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Aircraft Type and Registration: Bell 206B Jetranger III, G-OCBB

No & Type of Engines: 1 Allison 250-C20 turboshaft engine

Year of Manufacture: 1973

Date & Time (UTC): 9 November 1998 at 1550 hrs

Location: Oxford Airport

Type of Flight: Private (Training)

Persons on Board: Crew - 2 - Passengers - None

Injuries: Crew - 0 - Passengers - N/A

Nature of Damage: Uncontained failure of No 1 turbine. Compressor discharge tube, engine ancillaries and cowling ruptured

Commander's Licence: Airline Transport Pilot's Licence (Helicopters) with Instrument Rating

Commander's Age: 31 years

Commander's Flying Experience: 3,181 hours (of which 176 were on type)
Last 90 days - 127 hours
Last 28 days - 35 hours

Information Source: Aircraft Accident Report Form submitted by the pilot and metallurgical examination by the engine manufacturer

On a flight three days previously a high frequency noise or vibration had been heard and the aircraft was extensively checked on the day of the occurrence with no fault being found. In discussion with the engineer, the instructor on the incident flight learned that the freewheel unit had been suspected as the source of the problem. The incident flight was a dual training detail and a variety of exercises and emergency procedures were covered and the instructor kept the aircraft near to the airfield in case of any problem. After about 30 minutes flying the first autorotation was carried out from 750 feet agl. When autorotation had been established the instructor noticed that rotor RPM was decreasing and he checked that the student had the collective lever fully down. Seeing a rotor RPM of 90% and thinking that the low RPM might be due to a problem with the freewheel unit he started a power recovery at about 350 feet. As soon as the throttle was moved there was a large bang and shudder followed by the "ENGINE OUT" light and horn activating. He

took control and made a successful autorotative landing. He made a "MAYDAY" call, shut down the aircraft and with the student vacated normally.

There had been an uncontained failure of the No 1 turbine disk. After recovery of the aircraft the engine was dismantled in the presence of a representative from the manufacturer. The gas producer turbine components, including the remaining parts of the No 1 disk, were taken to the manufacturers metallurgical laboratory for examination. In the subsequent inspection and repair of the aircraft the freewheel unit was subjected to a half-life disassembly and inspection and no fault was found with it.

The engine manufacturer reported that failure of the first stage turbine disk was the result of accelerated interdendritic creep crack growth which had been caused by exposure to extremely high temperatures; shown by microstructural evidence to have been greater than 1200°C. Similarly, examination of the crystalline microstructure of No 2 disk showed that it had been heated above 1150°C. These temperatures were above the normal operating temperatures of the two disks and the evidence was consistent with the engine having experienced one or more hot starts.

The Turbine Outlet Temperature (TOT) indicator which was fitted in the aircraft had provision for a "tell tale light" to register and record hot start or overtemperature occurrences but it was not operational. Early aircraft, such as G-OCBB, delivered with this indicator were not equipped with the full system which was required for the tell-tale light to operate. Aircraft with later serial numbers (3567 and subsequent) had been delivered with the system operational. After the incident the operator implemented Bell Technical Bulletin 206-82-77 to install the necessary hardware and wiring to activate the system.