**ACCIDENT**

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| **Aircraft Type and Registration:** | Bell 206B Jet Ranger III, G-CVIP |
| **No & Type of Engines:** | 1 Allison 250-C20B turbine engine |
| **Year of Manufacture:** | 1981 |
| **Date & Time (UTC):** | 16 July 2005 at 1320 hrs |
| **Location:** | Flecknoe, Warwickshire |
| **Type of Flight:** | Private |
| **Persons on Board:** | Crew - 1 Passengers - 3 |
| **Injuries:** | Crew - None Passengers - None |
| **Nature of Damage:** | Tail pylon severed immediately aft of the horizontal stabiliser |
| **Commander's Licence:** | Private Pilot's Licence |
| **Commander's Age:** | 34 years |
| **Commander's Flying Experience:** | 113 hours (of which 30 were on type)<br>Last 90 days - 1.4 hours<br>Last 28 days - 0.7 hours |
| **Information Source:** | Aircraft Accident Report Form submitted by the pilot |

**History of the flight**

The pilot had hired the helicopter to carry out a local area flight from Sywell Aerodrome with three friends culminating with a landing at a private site at Flecknoe near Daventry. Prior to that flight he carried out a 28 day check flight with an instructor pilot which covered both normal and abnormal procedures including autorotations. The weather for the area of the flight was CAVOK with the surface wind at Sywell from 030° at 6 kt.

Having completed the pre-start checks, the pilot noted the fuel onboard was 67 USG and started the engine. He depressed the starter button and, as the engine $N_1$ increased to 15%, he opened the throttle. The engine accelerated normally and the power turbine inlet temperature remained within limits. As $N_1$ reached 50%, the engine began to run down. The pilot maintained the starter engagement until the $N_1$ reduced to approximately 20% at which point he shut down the engine. The pilot had never experienced this before and having pulled the starter circuit breaker, sought the assistance of a more experienced commercial pilot. That pilot sat in the aircraft and observed the second start which was normal without a repeat of the earlier problem.

The pilot completed the pre-takeoff checks and made a normal departure, climbing to 1,500 ft and flew around the local area for approximately 20 minutes. A course was set for the private site at Flecknoe and during the

transit the low voltage light "blinked" twice. The pilot depressed the light to test it and after blinking three times, it extinguished. The pilot considered it safe to continue whilst monitoring the light which, to his knowledge, did not illuminate again during the flight.

Upon reaching Flecknoe, the fuel was noted at 50 USG; engine temperatures and pressures were all normal. The QFE and surface wind check at Sywell were noted and Sywell AFIS was advised that the aircraft would be landing at Flecknoe and leaving the frequency. Before landing, the pilot flew over the landing site to confirm that it was clear of wires and other obstructions. He approached into wind and reduced speed to about 70 KIAS whilst lowering the collective control lever to establish a rate of descent. A check of the engine instruments showed all was normal and the approach was continued. At a height of approximately 100 ft he became aware of an intermittent audio warning tone followed by a continuous audio warning tone. He noted that the ROT LOW RPM warning light on the CWP (Central Warning Panel) was illuminated and so he immediately entered autorotation, concentrating on carrying out an engine-off landing. At about 20 ft the pilot flared the helicopter and raised the collective control lever "aggressively" to check the rate of descent. There was a loud bang and a violent shuddering through the airframe that coincided with the large control inputs. The pilot lowered the collective and allowed the aircraft to run along the grass surface. A cloud of smoke appeared to the pilot's left and he evacuated the passengers and shut down the helicopter.

When clear of the aircraft, the pilot checked that all his passengers were accounted for and there were no signs of fire with the aircraft. The tail pylon had been completely severed immediately aft of the horizontal stabiliser by the main rotor blades. The pilot notified the helicopter operator of the situation and shortly afterwards, one of the operator's staff attended the scene in another helicopter.

The passengers confirmed that they had heard the loud intermittent audio warning noise prior to the pilot entering autorotation. Witnesses watching the helicopter's approach informed the pilot that during the descent, the helicopter was seen to de-stabilise and the rotors coned upwards. This probably happened when the pilot entered autorotation.

**Engine and rotor warning systems**

The 'Engine Out' warning system is activated when $N_1$ drops below 55%. It comprises an intermittent audio signal and an illuminated ENG OUT caption on the CWP.

The 'Rotor Low RPM' audio warning is activated when the collective pitch lever is off the down stop and rotor RPM is less than 90%. It comprises a steady audio signal and an illuminated ROT LOW RPM caption on the CWP.

**Engineering action**

The engine was removed and sent by the operator to an approved overhaul facility for inspection and bench testing. Engine acceleration and deceleration checks were accomplished satisfactorily. These were accomplished for the second time and recorded parameters were within the specified limits. No hesitation was noted during starts and power transients. No magnetic chip light indications were observed. Oil consumption was recorded as nil. In all tests, the engine did not smoke during any phase of operation. The exhaust collector was dry and no smoke was observed after shut down. The test data indicated that the engine met the manufacturer's minimum specification requirements. No technical reason for a loss of power was identified.

**Analysis**

After the training flight, the pilot attempted to start the helicopter for his local area flight. In the absence of any technical reason, a possible cause of the inability of the engine to accelerate beyond 50% $N_1$ was the throttle not being opened sufficiently to permit adequate fuel flow. A second start was accomplished normally. During the flight, the low voltage warning light illuminated, indicating that the voltage in the battery had fallen momentarily below a pre-determined level.

On the final approach at about 100 ft the intermittent sound of the ENG OUT warning was heard. This was followed by the continuous tone of the low rotor RPM audio warning and confirmed by the illuminated ROT LOW RPM caption on the CWP. The pilot did not recall seeing the ENG OUT caption illuminated on the CWP. The pilot's prompt action of lowering the collective lever would have minimised further decay in rotor RPM but would have initiated a high rate of descent at a low height. The "aggressive" flare and reduction of the descent rate with the collective lever ensured that the helicopter did not perform a heavy or fast run-on landing, thereby avoiding the associated hazards to those on board. The large control movements did, however, cause the main rotor blades to sever the tail pylon.

The engine was still running once the helicopter was on the ground and had to be shut down by the pilot. The engineering investigation revealed no reason for a loss of power during the approach, but clearly, the pilot had the warnings and symptoms of some sort of power loss, and so he performed an emergency landing.