

ACCIDENT

Aircraft Type and Registration:	Bell 206B Jet Ranger, G-NEWS	
No & type of Engines:	1 Allison 250-C20B turboshaft engine	
Year of Manufacture:	1978	
Date & Time (UTC):	16 July 2006 at 1730 hrs	
Location:	Cambridge Airfield, Cambridgeshire	
Type of Flight:	Training	
Persons on Board:	Crew - 2	Passengers - None
Injuries:	Crew - None	Passengers - N/A
Nature of Damage:	Major damage to airframe, main and tail rotor blades	
Commander's Licence:	Private Pilot's Licence	
Commander's Age:	46 years	
Commander's Flying Experience:	2,421 hours (of which 235 were on type) Last 90 days - 29 hours Last 28 days - 11 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

Synopsis

An instructor pilot and his student were conducting a training flight as part of the student's type conversion. The instructor decided to complete the flight by having the student perform an Engine Off Landing (EOL). The touchdown was slower and heavier than normal and the aircraft bounced approximately 3 to 4 ft. On the second touchdown, the tail strike protector struck the ground, the tail rotor gearbox detached and the main rotor blades contacted the vertical stabilizer.

History of the flight

The student pilot was undertaking a 5-hour type conversion on the Bell 206B Jet Ranger; the training was being shared between two instructors. The same helicopter had been used for all of the training; it was

fitted with a high-skid landing gear. The operator encouraged instructors to keep run-on landing speeds to a minimum during EOLs in order to reduce the nose-down pitching moments that may be generated by the high-skid landing gear if the touchdown is mishandled.

On the Friday preceding the accident the student had undertaken a 0.9 hour training flight with the first instructor. On Saturday, the second instructor carried out two training flights of 1.2 hours and 0.9 hours respectively. The first flight on the Saturday concluded with autorotations and an EOL demonstration by the instructor. The second flight on the Saturday included practice force landings (PFLs) and an EOL; these

manoeuvres were performed by the student with the instructor assisting on the flight controls. The student then performed two further EOLs with verbal prompts only from the instructor. The flight was completed with three EOLs from the hover.

On Sunday, the day of the accident, the weather was good with a light surface wind, generally from 060° at 7 to 9 kt, CAVOK conditions and a surface temperature of 29°C. The instructor planned to carry out two flights; the first was to be an instructional flight and the second was to be a revision prior to the Licence Skills Test (LST). At the end of the first flight, the student performed two PFLs and two EOLs; all of these manoeuvres were unassisted and were flown to a satisfactory standard. On the second flight the necessary training was completed and the final exercise was to be an EOL.

The aircraft was positioned for the EOL onto a grass surface in the south helicopter training area, on a heading of 280°, at a height of 700 ft and an IAS of 90 kt. At a suitable distance, the instructor initiated the exercise and the student entered autorotation, the instructor then closed the throttle to idle. The student turned into the wind and at about 300 ft the instructor confirmed that it was safe to continue the EOL. The height and approach angle ensured that the EOL area would be achieved, the IAS was approximately 65 mph and the Rotor rpm (RRPM) was about 100%.

The student commenced the flare at the normal height and the rate of descent reduced. As the aircraft decelerated, the instructor called for the student to level the aircraft, which he did. At that point the skid height was about 8 ft with very little forward speed. As the aircraft began to descend the student raised the collective pitch control lever to cushion the landing. The instructor who was monitoring the collective thought the rate of application

seemed normal. The aircraft touched down heavily in a level attitude but bounced back into the air to a height of about 3-4 ft and the instructor took control. As the aircraft was climbing the 'LOW RRPM' warning horn sounded and the instructor attempted to cushion the second touchdown. He managed to control the aircraft to a skid height of approximately 2 ft in a stable attitude but had no further control below that height as the aircraft dropped. On contact with the grass surface the aircraft shuddered briefly for about two seconds then settled back to a normal vibration level. The instructor shut down the engine, applied the rotor brake and notified ATC of the situation. He then switched off the electrical system and once the main rotor had stopped, both he and the student vacated the aircraft through the normal exits. The airfield Rescue and Fire Fighting Service attended the scene within two minutes.

Engineering

From discussions with the repair agency it would appear that on the second touchdown the tail strike protector struck the ground. The force was such that it bent the tail pylon upwards at a point approximately 12 to 14 in aft of the pylon to fuselage attachment. The tail rotor gear box detached and the main rotor blades impacted the vertical stabilizer. The main rotor gearbox mounting plate had evidence of forward movement and the front left cross tube showed signs of a heavy impact.

Analysis

The EOL exercise had earlier been fully briefed and demonstrated by the instructor, and the student had successfully completed the exercise on the previous flights. The EOL was entered at a safe height, permitting adequate time for the student to stabilise the aircraft and position it for touchdown. Up to the point of raising the collective lever to cushion the touch down, the EOL appeared normal. The rate of upwards movement, whilst

not cushioning the touchdown also appeared normal. It is possible that following the heavy touchdown, the student continued to raise the collective which may have contributed to the height of the bounce. With the high collective pitch applied, the RRPM decayed rapidly limiting the effects of the flight controls as described by the instructor. The tail-first landing and contact of the tail rotor blade with the ground or airframe probably caused the tail rotor gearbox to separate.

Conclusions

The instructor considered that two possibilities existed which may have led to the accident. The student may

have made an inadequate collective input to reduce the sink rate; however, the instructor considered that the movement of the collective lever was appropriate and he believed that a normal touchdown should have followed. Alternatively, they may have encountered some form of windshear created by the light and variable surface wind which, when combined with the high ambient temperature, may have contributed to the accident. The high-skid landing gear fitted to the helicopter was not considered to be a factor in the accident.