Australian Government
Australian Transport Safety Bureau

Hard landing involving a Bell 206B, VH-EPQ

9 km north of Camden Airport, New South Wales, 31 July 2013

ATSB Transport Safety Report
Aviation Occurrence Investigation
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Published by: Australian Transport Safety Bureau
Postal address: PO Box 967, Civic Square ACT 2608
Office: 62 Northbourne Avenue Canberra, Australian Capital Territory 2601
Telephone: 1800 020 616, from overseas +61 2 6257 4150 (24 hours)
Accident and incident notification: 1800 011 034 (24 hours)
Facsimile: 02 6247 3117, from overseas +61 2 6247 3117
Email: atsbinfo@atsb.gov.au
Internet: www.atsb.gov.au

Addendum

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Hard landing involving a Bell 206B, VH-EPQ

What happened

On 31 July 2013, at about 1500 Eastern Standard Time,[1] an instructor and pilot under review departed Bankstown, New South Wales, in a Bell 206B helicopter, registered VH-EPQ (EPQ), to conduct a Helicopter Flight Review (HFR).[2] Having completed a number of other activities, the pilot under review was conducting practice autorotations[3] just south of Bringelly.

The pilot in command was an experienced instructor with about 3,500 hours total experience. The instructor advised the ATSB that the crew had conducted three practice autorotations with the planned completion of each exercise and go-around at about treetop height. The instructor reported that because they intended to go around, the flare was conducted higher than if they had planned to land. The procedure involved the pilot flaring[4] the helicopter as if to land, then increasing throttle, raising collective[5] and climbing away. The flare was initiated by aft cyclic[6] movement, which tilts the disc rearward reducing airspeed and rate of descent.

The instructor reported that after they had completed three autorotations, the pilot under review requested they carry out one more. He advised the ATSB that in initiating a practice autorotation, if the throttle is just wound off and the collective is lowered instantly, the engine will overspeed, with the potential to cause significant damage. His technique for initiating an autorotation is to roll the throttle off gently then lower collective.

At the commencement of the last autorotation, the instructor noticed that the pilot was heavy on the controls and asked him to 'relax his grip on the throttle'. At the flare point, the instructor attempted to increase the throttle, but he was unable to apply pressure against the pilot under review's resistance, which prevented him from increasing to full flight RPM. At that stage, the instructor considered that there was insufficient time to perform a power recovery, so he elected to perform an engine off landing. The instructor then noticed decaying rotor RPM so levelled the aircraft and tried to cushion the helicopter onto the ground with remaining RPM.

The helicopter contacted the ground with a slight nose-high attitude and as a result, the back of the skids contacted the ground, and with the rotor RPM now decayed, the rotor struck the tail boom, resulting in substantial damage. The crew were uninjured.

In a written report obtained by the ATSB, the pilot under review reported that after a stopover at a homestead, the crew flew the helicopter to the training area to conduct a practice autorotation. He reported that after the first autorotation, the instructor told him that he had let the rotor RPM drop to about 95% and should be mindful to keep it at 100%, and that they both agreed the flare could have been smoother and should try again. After climbing to 1,500 ft, they entered a second autorotation with power going to idle. The pilot under review reported that he noticed with

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1 Eastern Standard Time (EST) was Universal Coordinated Time (UTC) + 10 hours.

2 The Civil Aviation Safety Authority requires all private and commercial helicopter pilots to undergo a Helicopter Flight Review (HFR) every 2 years to maintain validation of their pilot licence. See Appendix C of CAAP 5.81-1(1).

3 Autorotation is a condition of descending flight where, following engine failure or deliberate disengagement, the rotor blades are driven solely by aerodynamic forces resulting from rate of descent airflow through the rotor. The rate of descent is determined mainly by airspeed.

4 Flare is aimed to reduce rate of descent before ground impact by increasing collective pitch; this increases lift, trading stored rotor kinetic energy for increased aerodynamic reaction by blades, and should result in a gentle touchdown.

5 The collective pitch control, or collective, is a primary flight control used to make changes to the pitch angle of the main rotor blades. Collective input is the main control for vertical velocity.

6 The cyclic pitch control, or cyclic, is a primary flight control that allows the pilot to fly the helicopter in any direction of travel: forward, rearward, left, and right.

collective down he had to increase descent speed to 68-70 kt to maintain rotor RPM at 100%. He reported that this meant they had a faster approach to ground than the previous autorotation.

The pilot under review reported that when he entered the flare and in the hover, he noticed the rotor RPM was low and didn't think he could maintain a hover while RPM was decaying, 'so we landed'. Upon landing he noticed a black object go past his peripheral vision on the starboard side. The pilot under review considered that there must have been too much aft cyclic on landing that allowed one rotor blade to contact the tail rotor boom.

ATSB comment

The ATSB was unable to reconcile the differences in the two pilot reports.

Safety message

The Federal Aviation Authority (FAA) reported that a high number of accidents were associated with the practice autorotation with a power recovery and the American Aircraft Owners and Pilots Association (AOPA) found that more accidents happen each year from practice autorotations than from actual engine failures. The following links provide information regarding accidents related to practice autorotations:

- www.ainonline.com/aviation-news/hai-convention-news/2012-02-13/instructor-pilots-give-guidance-autorotation-training
- www.ainonline.com/aviation-news/aviation-international-news/2013-05-01/astar-accident-shines-light-autorotation-training
- www.aviationtoday.com/rw/training/specialty/Flight-Training-Tips-Dancing-With-the-Devil_13632.html
- http://blog.aopa.org/helicopter/?p=725
- www.robinsonheli.com/srvclib/rhcsn-38.pdf
- www.faa.gov/documentLibrary/media/Advisory_Circular/AC_61-140.pdf
- www.faasafety.gov/files/gslac/library/documents/2011/Aug/56414/FAA%20P-8740-71%20Planning%20Autorotations%20[hi-res]%20branded.pdf

General details

Occurrence details

Date and time:	31 July 2013 – 1600 EST	
Occurrence category:	Accident	
Primary occurrence type:	Hard landing	
Location:	9 km north of Camden Airport, New South Wales	
	Latitude: 33° 57.52' S	Longitude: 150° 42.52' E

Helicopter details

Manufacturer and model:	Bell Helicopter Company 206B	
Registration:	VH-EPQ	
Type of operation:	Flying training	
Persons on board:	Crew – 2	Passengers – Nil
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Substantial	

About the ATSB

The Australian Transport Safety Bureau (ATSB) is an independent Commonwealth Government statutory agency. The Bureau is governed by a Commission and is entirely separate from transport regulators, policy makers and service providers. The ATSB's function is to improve safety and public confidence in the aviation, marine and rail modes of transport through excellence in: independent investigation of transport accidents and other safety occurrences; safety data recording, analysis and research; and fostering safety awareness, knowledge and action.

The ATSB is responsible for investigating accidents and other transport safety matters involving civil aviation, marine and rail operations in Australia that fall within Commonwealth jurisdiction, as well as participating in overseas investigations involving Australian registered aircraft and ships. A primary concern is the safety of commercial transport, with particular regard to fare-paying passenger operations.

The ATSB performs its functions in accordance with the provisions of the *Transport Safety Investigation Act 2003* and Regulations and, where applicable, relevant international agreements.

The object of a safety investigation is to identify and reduce safety-related risk. ATSB investigations determine and communicate the safety factors related to the transport safety matter being investigated.

It is not a function of the ATSB to apportion blame or determine liability. At the same time, an investigation report must include factual material of sufficient weight to support the analysis and findings. At all times the ATSB endeavours to balance the use of material that could imply adverse comment with the need to properly explain what happened, and why, in a fair and unbiased manner.

About this report

Decisions regarding whether to conduct an investigation, and the scope of an investigation, are based on many factors, including the level of safety benefit likely to be obtained from an investigation. For this occurrence, a limited-scope, fact-gathering investigation was conducted in order to produce a short summary report, and allow for greater industry awareness of potential safety issues and possible safety actions.