



Australian Government

Australian Transport Safety Bureau

Collision with terrain involving Bell 206, VH-SDZ

75 km NE of Emerald Airport, Queensland, on 18 November 2017

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Addendum

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Collision with terrain involving Bell 206, VH-SDZ

What happened

At 1242 Eastern Standard Time¹ on 18 November 2017, a Bell 206 helicopter, registered VH-SDZ (SDZ), departed from Middelmount Airport, Queensland with a pilot and crew member on board to conduct power line inspections 32 km to the south.

At approximately 1255, the pilot positioned the helicopter in a hover 30 ft above the ground and 40 metres from a transmission tower so that it could be photographed by the crew member. After 3-4 minutes of hovering, the pilot heard what was described as a 'very loud bang' through the airframe, which was also felt through the controls. The helicopter began to shake violently and bounce vertically. The pilot also reported seeing tiny pieces of debris falling in front of the helicopter.

In response, the pilot immediately lowered the collective, intending to land in a clear area below the helicopter, but it did not respond to collective or cyclic control inputs. Instead, the helicopter began to pitch upward and drift backwards. The helicopter then yawed to the right, most likely due to contact with trees behind. The yaw could not be controlled with the tail rotor pedals so the pilot moved the throttle to the idle position. Despite attempts to level the aircraft, the left skid contacted the ground first and the helicopter rolled over.

The pilot moved the throttle and fuel shut off valve to the off position and switched off the battery before both occupants exited the helicopter. The pilot and the crew member were uninjured as a result of the occurrence.

Figure 1: VH-SDZ following collision with terrain



Source: Operator

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

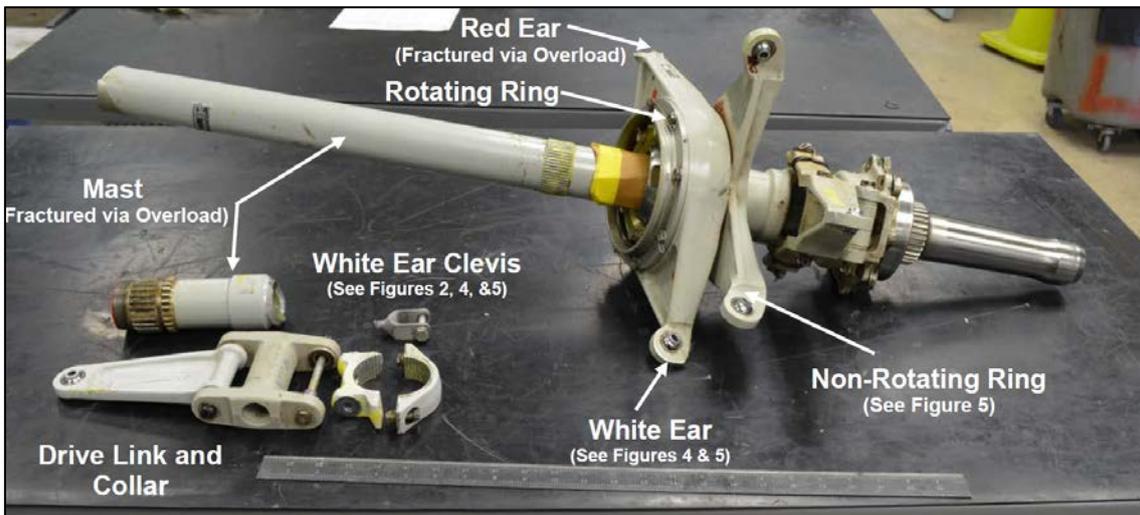
Component examination

Examination of the helicopter following the occurrence identified that the mast, both pitch links, and the swashplate were fractured. The mast collar set was also fractured and not engaged with the mast². The operator initially suspected that the mast collar set had disengaged in flight.

The mast collar secures the swashplate's rotating ring to the mast. It is designed to drive the rotating ring at the same speed as the main rotor. If the mast collar is not engaged, the pitch links connecting the swashplate to the rotors are exposed to transverse forces for which they are not designed. This can result in the pitch links winding around the mast.

The fractured components and trunnion bearings (connecting the pitch links to the rotor blades) were sent to Bell Helicopter's Engineering Laboratories for detailed examination (Figure 2). The initial examinations were also attended by the United States Federal Aviation Administration. Bell provided a report of their findings to the ATSB.

Figure 2: Components examined at Bell Helicopter's Engineering Laboratories



Source: Bell Helicopter

The hypothesis of mast collar separation was considered by Bell Engineering Laboratories. It was determined that an in-flight separation would likely have resulted in rotational damage on the mast and mast collar splines, which was not observed. The damage observed in the pitch links was also not consistent with a separated mast collar.

Bell Helicopter concluded that all of the fractures, including that resulting in the mast collar separation, were a result of overstress. No pre-existing defect was found and all damage observed was secondary to the occurrence. Seized or damaged trunnion bearings were also considered for inhibited movement of the pitch links, which could result in abnormal bending loads. However, the condition of the trunnion bearings was found to be typical for bearings removed from service.

In summary, there were no findings made during the inspection at Bell Helicopter's Engineering Laboratories that identified the probable factors contributing to this occurrence. The reason for the loss of control was therefore not determined.

Findings

While hovering, the pilot experienced a loss of cyclic and collective control that resulted in a ground collision. The reason for the loss of control was not able to be determined.

² The Drive Link Assembly (including the drive link and mast collar set) connects the swashplate to the mast, so that they rotate together. The swashplate adjusts the pitch of the main rotor blades via the pitch links.

Safety message

This accident highlights how rapidly an emergency situation can develop. Recognising that the pilot had limited control authority on this occasion, regular practice and/or briefing of emergency actions will increase the likelihood of a correct response.

General details

Occurrence details

Date and time:	18 November 2017 – 1255 EST	
Occurrence category:	Accident	
Primary occurrence type:	Collision with Terrain	
Location:	75 km NE of Emerald Airport, Queensland	
	Latitude: 23° 5.27' S	Longitude: 148° 41.8' E

Aircraft details

Manufacturer and model:	Bell Helicopter Co 206B	
Registration:	VH-SDZ	
Operator:	Helistar Aviation	
Serial number:	4648	
Type of operation:	Aerial Work	
Persons on board:	Crew – 2	Passengers – 0
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Substantial	

About the ATSB

The ATSB is an independent Commonwealth Government statutory agency. The ATSB 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 operations involving the travelling public.

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.