Australian Government
Australian Transport Safety Bureau

Collision with terrain involving a Robinson R22, VH-ZZM

115 km W of Rockhampton Airport, Queensland, 12 July 2014

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Aviation Occurrence Investigation
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Addendum

Page	Change	Date
3	Crew Injuries amended from Nil to 1 Minor 1 Serious, Operation type changed from Mustering to Flying training	02 March 2016

Collision with terrain involving a Robinson R22, VH-ZZM

What happened

On 12 July 2014, a pilot was undergoing training for mustering approval by a supervising pilot in a Robinson R22 helicopter, registered VH-ZZM. The day's flying commenced at about 0715 Eastern Standard Time (EST), and after completing about 7 hours of mustering, the helicopter was returning to a homestead near Dingo, Queensland.

At about 1500 EST, during the ferry flight, when about 1,000 ft above ground level (AGL) and at about 85-90 kt indicated airspeed, the supervising pilot instructed the pilot to conduct a practice autorotation[1] turning through 180°, which the pilot completed, increasing power when at about 5 ft AGL. During the subsequent climb, when at about 450 ft AGL and 40 kt indicated airspeed, the supervising pilot took control of the helicopter and initiated a second autorotation.

The supervising pilot initially observed the airspeed at about 65 kt, the rotor rpm in the green arc and the autorotation 'looking good', and assumed at this stage that he had handed control of the helicopter to the other pilot. At about 100 ft AGL, the other pilot detected the rotor rpm decaying and a rapid rate of descent, but assumed that the supervising pilot still had control of the helicopter. When at about 20-40 ft AGL, the supervising pilot observed the vertical speed increasing and the rotor rpm decreasing and rapidly lowered the collective[2] and increased the throttle. Just prior to the helicopter contacting the ground, the supervising pilot flared, then levelled the helicopter while increasing the throttle and raising the collective.

The helicopter landed hard, bounced once and rotated through about 180° before coming to rest. The supervising pilot turned off the master switch, activated the emergency beacon, selected the fuel to OFF and contacted emergency services. The pilot sustained serious injuries and the supervising pilot minor injuries. The helicopter was substantially damaged (Figure 1).

Figure 1: Damage to VH-ZZM

Source: Owner

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1 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.

2 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.

Pilot comments

The pilot under supervision provided the following comments:

- He thought that the supervising pilot was demonstrating the autorotation and had control of the helicopter as he had not stated 'your machine'.
- With the low height and speed at which the second practice autorotation was commenced, he believed that he would not have had a sufficient level of expertise to safely perform the manoeuvre.
- It took about 15 seconds from commencing the autorotation at about 450 ft AGL to contacting the ground.

Safety message

This incident highlights the importance of good communication between a flight instructor and their student and the use of handover/takeover techniques to clarify who has control of the aircraft at any time. Clear instructions and demonstration of the sequence to be flown as well as continual assessment of the student's understanding and skill level are essential components of flight instruction. Instructors need to know when to take over and how far to allow a pilot to continue with a manoeuvre to ensure both the safety of the flight and the development of pilot skill.

The United States Federal Aviation Authority (FAA) reported that a high number of accidents were associated with practice autorotations with a power recovery. However, engine failure and the mishandling of subsequent autorotation often leads to accidents or serious incidents. The benefits of practice autorotations must be weighed against the risk of incidents during practice autorotations.

Successful performance of autorotative flight is required to be demonstrated by helicopter pilots for licencing purposes as defined in the Civil Aviation Safety Authority Day VFR Syllabus (www.casa.gov.au/wcmswr/_assets/main/fcl/download/vfrhsfull.pdf). Entry to and maintenance of autorotative flight and power recovery, termination and autorotative landing are skills to be executed as part of 'Advanced Manoeuvres and Procedures'. Management of abnormal and emergency situations including engine failure during level flight, take-off, final approach and hover must also be demonstrated.

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 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.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:	12 July 2014 – 1513 EST	
Occurrence category:	Accident	
Primary occurrence type:	Collision with terrain	
Location:	115 km W Rockhampton Airport, Queensland	
	Latitude: 23° 07.20' S	Longitude: 149° 23.27' E

Helicopter details

Manufacturer and model:	Robinson Helicopter Company R22 Beta	
Registration:	VH-ZZM	
Serial number:	3499	
Type of operation:	Flying training	
Persons on board:	Crew – 2	Passengers – Nil
Injuries:	Crew – 1 Minor, 1 Serious	Passengers – Nil
Damage:	Substantial	

About the ATSB

The Australian Transport Safety Bureau (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 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.