



**Australian Government**

**Australian Transport Safety Bureau**

# Collision with terrain involving a Robinson R22, VH-CMK

Archerfield Airport, Queensland, 28 February 2015

**ATSB Transport Safety Report**  
Aviation Occurrence Investigation  
AO-2015-025  
Final – 10 June 2015

Released in accordance with section 25 of the *Transport Safety Investigation Act 2003*

#### **Publishing information**

**Published by:** Australian Transport Safety Bureau  
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#### **Addendum**

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# Collision with terrain involving a Robinson R22, VH-CMK

## What happened

On the morning of 28 February 2015, an instructor and student were conducting a training flight in a Robinson R22, registered VH-CMK, at Archerfield Airport, Queensland. The objective of the flight was to teach the student how to manage jammed anti-torque pedal<sup>1</sup> and jammed collective<sup>2</sup> emergencies. Conditions were fine and clear with a light and variable wind.

The flight commenced with the instructor flying the helicopter in a set direction, demonstrating how to effectively control the helicopter with the pedals jammed in position. The jammed pedal condition was simulated by holding the pedals in a set position with foot pressure, then manipulating the other flight controls and adjusting engine power and airspeed to control the helicopter. Satisfied that the key elements of the demonstration had been effectively addressed and nearing the boundary of the area in which the helicopter had been cleared to operate, the instructor turned the helicopter through about 180 degrees and commenced a similar demonstration travelling in the opposite direction.

During the second demonstration, the helicopter was established in forward flight around 15 ft above the ground at an airspeed of about 40 kt. The instructor simulated a jammed pedal condition, setting the left pedal slightly forward of the neutral position. As the demonstration progressed, the instructor elected to complete the exercise by conducting a simulated jammed pedal run-on<sup>3</sup> landing. The helicopter touched down on a grass surface near the northern boundary of the airport, just outside the runway strips associated with runways 22R/04L and 22L/04R. The grass in the area where the helicopter touched down was slightly longer than the grass on the runway strips, but the instructor was comfortable continuing with the run-on landing, noting that it was not uncommon to operate helicopters on that surface.

The demonstration went as expected up until the point that the helicopter touched down. Still travelling forward at about 10 to 15 kt, the helicopter bounced slightly and yawed to the left. The instructor discontinued the demonstration at that moment, allowing himself full use of the pedals, but he was unable to correct the yaw before the helicopter touched down again. When the helicopter touched down a second time after a very short and shallow bounce, even though the helicopter was level, the forward part of the right skid dug into a surface undulation. The right skid then effectively acted as a pivot, tipping the helicopter to the right. The instructor fully lowered the collective but the roll continued. The instructor then applied left cyclic<sup>4</sup> but he was unable to stop the helicopter rolling onto its right side.

Aware that a fuel leak had developed, the instructor closed the fuel shut-off valve and turned the master electrical switch off. The instructor and student moved to a safe distance following which the instructor contacted air traffic control (who alerted emergency services). The instructor and student suffered minor injuries and the helicopter was substantially damaged.

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<sup>1</sup> The anti-torque pedals are used in a conventional helicopter to adjust the pitch of the tail rotor blades, thereby adjusting the tail rotor thrust which counters the torque effect of the main rotor and controls the helicopter in the yawing plane. Pedal pressure is varied in response to changing conditions such as power changes and airspeed, to maintain coordinated flight. A jammed pedal condition denies the pilot the ability to use the pedals to vary tail rotor thrust.

<sup>2</sup> Collective is the primary helicopter flight control that simultaneously affects the pitch of all blades of the lifting rotor. Collective input is the main control for vertical velocity.

<sup>3</sup> A run-on landing is a helicopter landing that is made with forward speed.

<sup>4</sup> Cyclic is a primary helicopter flight control that is similar to an aircraft control column. Cyclic input tilts the main rotor disc varying the attitude of the helicopter and hence the lateral direction.

## Instructor comment

The instructor made the following comments in relation to the accident:

- The nature of the surface (outside the runway strips) probably contributed to the accident, given the manner in which the right skid dug into a surface undulation. There was a current NOTAM<sup>5</sup> at the time of the accident stating that grass areas were soft and wet, but the reason the skid dug in rather than skipped forward, seemed to relate more directly to the slightly undulating nature of the surface, rather than how firm the surface was. During future similar exercises involving run-on landings on unprepared surfaces, the instructor intends to inspect the surface for suitability beforehand.
- The instructor was mindful of the possibility of dynamic rollover<sup>6</sup> under the circumstances, so consciously avoided applying power and collective as the helicopter tipped.
- The instructor had invited the student to place his hands and feet lightly on the controls during the demonstration, to maximise the training benefit of the exercise. The instructor commented that the student may have inadvertently applied some pressure on the pedals during the accident, which could have reduced the effectiveness of the instructor's attempt to correct the yaw after the initial bounce.

## Safety message

This accident highlights the manner in which some hazards may not be immediately obvious. Helicopter training organisations are encouraged to consider the quality of the landing area surface during hazard identification and risk assessment processes associated with training operations, particularly those that involve run-on landings.

## General details

### Occurrence details

Date and time:	28 February 2015 – 0750 EST	
Occurrence category:	Accident	
Primary occurrence type:	Collision with terrain	
Location:	Archerfield Airport, Queensland	
	Latitude: 27° 33.8' S	Longitude: 153° 00.8' E

### Aircraft details

Manufacturer and model:	Robinson R22	
Registration:	VH-CMK	
Serial number:	4223	
Type of operation:	Flying training	
Persons on board:	Crew – 2	Passengers – Nil
Injuries:	Crew – 2 (minor)	Passengers – Nil
Damage:	Substantial	

<sup>5</sup> A NOTAM (Notice to Airmen) advises personnel concerned with flight operations of information concerning the establishment, condition or change in any aeronautical facility, service, procedure or hazard, the timely knowledge of which is essential to safe flight.

<sup>6</sup> In brief, dynamic rollover is the occurrence of a rolling motion while part of the landing gear is acting as a pivot. If the helicopter exceeds a critical angle it will roll onto its side.

## 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.