

Australian Government Australian Transport Safety Bureau

# Partial engine power loss and ditching involving Robinson R44, VH-WRR

49 km N of Hamilton Island Airport, Queensland, 8 November 2017

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#### Addendum

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# Partial engine power loss and ditching involving Robinson R44, VH-WRR

## What happened

On 8 November 2017, at about 1508 Eastern Standard Time,<sup>1</sup> the pilot of a Robinson R44 helicopter, registered VH-WRR and operated by Whitsunday Air Services, ditched about 49 km north of Hamilton Island Airport, Queensland. In addition to the pilot, there were three passengers on board.

Prior to the flight, the passengers received a safety briefing and were instructed to wear seatbelts and life jackets. At about 1430, the helicopter departed Hamilton Island for a 1 hour scenic (charter) flight over Whitehaven Bay and the Great Barrier Reef.

When about 40 minutes into the flight, on return to Hamilton Island, the pilot heard the engine sound decrease and noted that the helicopter was unable to maintain the cruise altitude of 1,000 ft. The pilot checked the manifold pressure<sup>2</sup> gauge and noted it was at 22 inches Hg, however, it was set at 24.5 inches Hg when leaving the reef between 500 and 1,000 ft. In response to the reduction in power, the pilot raised the collective<sup>3</sup> to increase power and maintain altitude, but the manifold pressure did not change. The pilot reported that the indicated main rotor revolutions per minute (RPM) decreased and the low rotor RPM horn activated. The engine RPM indication was also oscillating throughout the range.

In response to the low RPM horn, the pilot increased throttle and again raised the collective. The rotor RPM initially spiked and then decreased with associated re-activation of the low rotor RPM horn. The engine RPM gauge continued to oscillate and the helicopter could not maintain altitude. The pilot noticed the engine noise was changing with the fluctuations in the indications. However, there were no further indications that suggested a problem with the helicopter.

Consequently, when at 700 ft, the pilot elected to conduct an autorotation<sup>4</sup> onto the water. The pilot activated the emergency flotation system<sup>5</sup> and broadcast a MAYDAY<sup>6</sup> call on the common traffic advisory frequency. The engine RPM gauge continued to provide erratic readings and the low engine sound continued during the landing. About 30 seconds later, the helicopter landed on the water with the emergency floats deployed (Figure 1).

The pilot contacted another company pilot who was operating in the area and informed them of the situation and their location. The pilot shut down the engine and applied the rotor brake.<sup>7</sup> The pilot activated the emergency locator transmitter and instructed the passengers to prepare to inflate their life jackets and undo their seatbelts in readiness to exit the helicopter.

About 10 to 15 minutes later, the company aircraft was circling overhead. The pilot and passengers remained in the helicopter until they were rescued by the crew of a local vessel about

<sup>&</sup>lt;sup>1</sup> Eastern Standard Time is Coordinated Universal Time (UTC) + 10 hours.

<sup>&</sup>lt;sup>2</sup> Manifold pressure: Pressure in the inlet manifold of a piston engine, normally local atmospheric, measured in inches of mercury (Hg).

<sup>&</sup>lt;sup>3</sup> Collective: a primary helicopter flight control that simultaneously affects the pitch of all blades of a lifting rotor. Collective input is the main control for vertical velocity.

<sup>&</sup>lt;sup>4</sup> 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.

<sup>&</sup>lt;sup>5</sup> Emergency floatation system: inflatables fitted to the aircraft to provide water buoyancy in an emergency.

<sup>&</sup>lt;sup>6</sup> MAYDAY: an internationally recognised radio call announcing a distress condition where an aircraft or its occupants are being threatened by serious and/or imminent danger and the flight crew require immediate assistance.

<sup>&</sup>lt;sup>7</sup> The rotor brake is a device used to stop the rotor blades during shutdown.

1 hour later. All occupants were uninjured. While there appeared to be no observable damage sustained to the helicopter, it later sank and was unable to be recovered.

# Figure 1: VH-WRR after ditching about 49 km north of Hamilton Island Airport, Queensland



Source: Australian Maritime Safety Authority, modified by the ATSB

# **Additional comments**

The following additional comments were made with regard to the accident:

- The pilot reported refuelling the helicopter prior to the flight and conducting a check for contaminants, none of which was found. After the helicopter had landed on the water, the fuel gauges indicated that the tanks were half full.
- A review of the meteorological conditions around the time of the accident indicated they were conducive to serious <u>carburettor icing conditions</u> with descent power selected.
- The Civil Aviation Safety Authority noted the partial power loss described in this accident may be consistent with a magneto/governor failure, which has reported to have occurred on other R44 helicopters.
- A maintenance log book entry around 2 weeks prior to the accident noted that the helicopter had intermittent tachometer/governor fluctuations. The right magneto points were found to be out-of-tolerance and adjusted. A ground run to test the adjusted magneto was completed satisfactorily. Robinson Helicopter Company had issued <u>Service Letter 62</u>, which stated that the throttle governor signal source was 'the tachometer breaker contact (points) assembly located within the engine-right magneto...excessive wear causing insufficient point gap...(that) could cause an erratic tachometer indication.'
- Post-accident discussions between the manufacturer, operator and maintenance provider resulted in a consensus of opinion that the power reduction was associated with either a governor control failure and or a compromised engine RPM signal from poor tachometer points.

### Similar occurrences

A search of the ATSB's database found the following occurrences involving an engine power loss followed by a ditching in helicopters:

On 3 January 2011, a Robinson R44 helicopter, departed Cairns Airport, Queensland for a 30 minute charter flight (ATSB investigation <u>AO-2011-001</u>). About 25 minutes into the flight, when at about 400 ft above mean sea level, the engine failed and the rotor low RPM horn sounded. The pilot broadcast a MAYDAY and entered autorotation. During the descent, he deployed the emergency floatation system, however, the right float did not fully inflate. When at about 50 ft above the sea, the helicopter entered an uncommanded 360° yaw to the left. The pilot was unable to control the yaw and the helicopter impacted the water heavily and turned

onto its right side. The pilot assisted the passengers to egress and inflated their life jackets. A post-occurrence engine strip and examination found no fault that would give reason for the engine to fail in flight.

 On 26 January 2011, a Robinson R44 helicopter departed the Knuckle Reef helipad, Queensland, for a 20 minute charter flight (ATSB investigation <u>AO-2011-008</u>). On board the helicopter were the pilot and three passengers. While returning to the helipad 15 minutes later, at about 950 ft above sea level, the helicopter experienced engine problems, including a sudden loss of cylinder head temperature indication and variations in the engine manifold pressure. The helicopter was unable to maintain altitude and began to descend at 200 ft per minute. The pilot inflated the emergency floatation system, commenced an autorotation and landed on the sea. Following the safe recovery of the occupants, the helicopter was unable to be recovered.

# **Findings**

These findings should not be read as apportioning blame or liability to any particular organisation or individual.

• During the cruise, for undetermined reasons, the helicopter experienced a partial engine power loss. After unsuccessful attempts to increase power, the pilot manually deployed the emergency floatation system and performed a successful ditching.

# Safety message

## Power loss

Without the recovery of the helicopter, the reasons for the partial engine power loss could not be conclusively determined. However, the indications were consistent with a magneto/governor failure, which Robinson Helicopter Company have published a revised service letter <u>Governor</u> <u>troubleshooting / magneto maintenance</u> describing how the failure occurs and the compliance procedure.

The pilot commented that this was the first time he had been involved in an emergency situation and the training he received prepared him well for executing the autorotation and managing the situation after landing on the water.

The United States Federal Aviation Administration <u>Helicopter Flying Handbook</u> stated that, when rotor RPM begins to decrease, it is essential to recover and maintain RPM. Low rotor RPM and ensuing blade stall can result in a total loss of rotor lift, allowing the helicopter to fall to the surface and possibly resulting in blade strikes to the tail boom and other airframe damage. Low rotor RPM during an autorotation may result in a less than successful result.

## Survival factors

This accident highlights the importance of being adequately prepared for an emergency situation such as a ditching. In this case, the helicopter was fitted with an emergency floatation system, the passengers were wearing life jackets, and the pilot's post-landing actions resulted in a positive outcome where no injuries occurred. Without a floatation system the risk of the helicopter sinking with the occupants on board would be greatly increased.

# **General details**

### Occurrence details

Date and time:	8 November 2017 – 1508 EST		
Occurrence category:	Accident		
Primary occurrence type:	Ditching		
Location:	Hamilton Island Airport, Queensland		
	Latitude: 19° 54.15' S	Longitude: 149° 05.37' E	

## Aircraft details

Manufacturer and model:	Robinson Helicopter Company		
Registration:	VH-WRR		
Operator:	Whitsunday Air Services Pty Ltd		
Serial number:	2410		
Type of operation:	Charter		
Persons on board:	Crew – 1	Passengers – 3	
Injuries:	Crew-0	Passengers – 0	
Aircraft damage:	Destroyed		

# 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 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.