Australian Government
Australian Transport Safety Bureau

Partial power loss involving a Bell 47G, VH-RTO

9 km SE of Essendon Airport, Victoria, 15 August 2013

ATSB Transport Safety Report
Aviation Occurrence Investigation
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Addendum

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Partial power loss involving a Bell 47G, VH-RTO

What happened

On 15 August 2013, at about 1030 Eastern Standard Time,[1] the pilot of a Bell 47G helicopter, registered VH-RTO, departed Essendon, Victoria on a return private flight.

At about 1130, when returning to Essendon, the pilot was instructed by air traffic control (ATC) to conduct one orbit due to traffic in the area. After completing the orbit, ATC instructed the pilot to conduct a second orbit.

While maintaining 1,400 ft above mean sea level (AMSL), the second orbit was commenced. Shortly after, the helicopter began to vibrate severely, yaw from side to side in an oscillating motion, and the rotor revolutions per minute (RRPM) decreased. In response, the pilot lowered the collective[2] in attempt to increase the RRPM, rolled on throttle, and manipulated the anti-torque pedals to counteract the yaw. However, the intensity of the vibrations increased and the oscillating yaw continued. The pilot also reported that the helicopter's engine was 'coughing' and 'spluttering'.

The pilot stated that the helicopter's engine appeared to be losing and then regaining power, and that the resultant change in torque was causing the yaw. The vibrations also increased when throttle was rolled on.

The pilot continued to manipulate the controls; however, as the helicopter was unable to maintain altitude and RRPM, he elected to conduct an autorotation. The pilot lowered the collective and rolled off throttle; the vibrations reduced, but the yaw continued. He then observed a park ('Merri Park') to his left, which was suitable for landing (Figure 1). The pilot broadcast a 'MAYDAY'[3] call, which was acknowledged by ATC.

Figure 1: Location of 'Merri Park'

Source: Google earth

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

2 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.

3 Mayday is an internationally recognised radio call for urgent assistance.

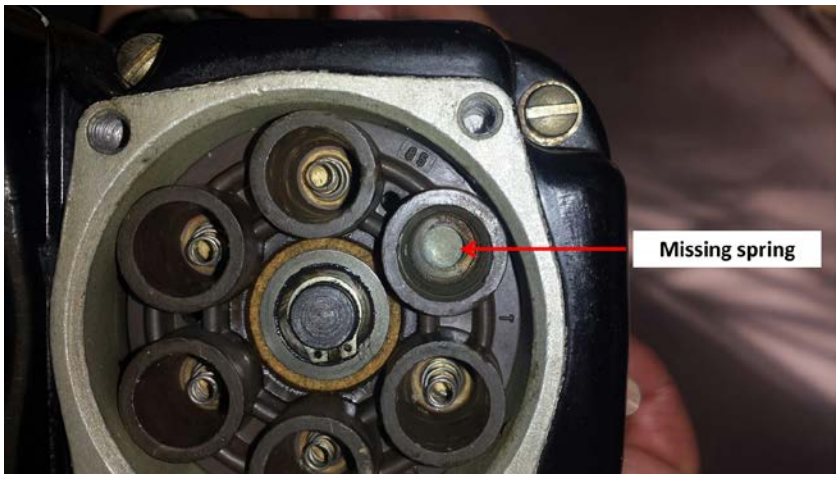
About 20-30 seconds after the vibrations and yaw commenced, with some power remaining, the helicopter landed in the park with nil injuries or damage sustained. After landing, the pilot reported that the engine ran relatively smooth when at idle. He shut down the helicopter and exited.

The pilot was later advised by witnesses that the sound of the helicopter did not appear normal and white 'puffs' of smoke were observed emanating from the exhaust system.

Engineering inspection

An engineering inspection identified that a spring in the distributor block of the left magneto was missing (Figure 2), which resulted in cross firing in the distributor and an associated loss of power. A new spring was fitted and the left magneto tested, with nil faults found. It could not be determined when or how the spring went missing.

Figure 2: Left magneto distributor block



Source: Maintenance provider

Pilot comment

The pilot reported that landing immediately with some power remaining and when a suitable landing area was available, was a more favourable situation than attempting to extend the flight further. The pilot also stated that he later spoke to a helicopter licensed aircraft maintenance engineer (LAME), who indicated that the situation could have deteriorated and a total power loss may have occurred.

Safety message

A partial engine power loss presents a more complex situation to the pilot than a complete power loss. Pilots have been trained to respond to a complete power loss, and the limited time within which to respond is continually emphasised throughout training in an attempt to make it second nature. However, pilots are not generally trained to deal with a partial power loss. Following a complete engine failure, a forced landing or autorotation is inevitable, but for a partial power loss, pilots are faced with making the difficult decision of whether to continue flight or to land immediately.[4] This incident highlights the importance of making timely decisions when a situation develops and the benefits of landing as soon as possible, before the situation deteriorates further.

[4] http://www.atsb.gov.au/publications/2010/avoidable-3-ar-2010-055.aspx

General details

Occurrence details

Date and time:	15 August 2013 – 1139 EST	
Occurrence category:	Serious incident	
Primary occurrence type:	Partial power loss	
Location:	9 km SE of Essendon Airport, Victoria	
	Latitude: 37° 46.336' S	Longitude: 144° 59.179' E

Helicopter details

Manufacturer and model:	Bell Helicopter Company 47G-5A	
Registration:	VH-RTO	
Serial number:	25052	
Type of operation:	Private	
Persons on board:	Crew – 1	Passengers – Nil
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Nil	

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.