

Robinson R44, G-NIOL

AAIB Bulletin No: 2/2004	Ref: EW/G2003/04/05	Category: 2.3
Aircraft Type and Registration:	Robinson R44, G-NIOL	
No & Type of Engines:	1 Lycoming O540 piston engine	
Year of Manufacture:	2003	
Date & Time (UTC):	10 April 2003 at 1607 hrs	
Location:	Brightling, Sussex	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - None
Injuries:	Crew - 1 (Minor)	Passengers - N/A
Nature of Damage:	Helicopter destroyed	
Commander's Licence:	JAR Private Pilot's Licence	
Commander's Age:	41 years	
Commander's Flying Experience:	116 hours (of which 59 were on type)	
	Last 90 days - 58 hours	
	Last 28 days - 43 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot and additional investigation work by the AAIB	

The pilot had planned to fly from Lydd to a landing site near Heathfield, West Sussex. The pre-flight checks were normal with no abnormalities, apart from the requirement to add one litre of oil. When the helicopter was started the surface temperature was +6°C.

Whilst in the cruise, at an altitude of 1,200 feet and at 100 kts IAS, the pilot passed the southern edge of a rain shower. He applied carburettor heat to raise the induction air temperature from just below the +10°C mark to about +12°C to +14°C, because of the possibility of increased moisture in the air causing carburettor icing. Shortly after he noticed that the pitot-static instruments were fluctuating, with variations in indicated airspeed of 20-30 kts, vertical speed excursions up to 1,000 fpm and similar effects upon the altimeter, however, no major turbulence was present. The pilot decided to reduce speed to 70 kts to see if this had any effect on the fluctuating instruments.

As he reached this speed, he became aware of the governor opening the throttle, apparently in response to a slight yaw. He then states that the engine and rotor RPM started to decay, he attempted to roll the throttle open but found that it was already fully open. Correcting the yaw with right pedal, he lowered the collective and rolled the throttle closed to enter autorotation. As autorotation was established, he raised the collective slightly to reduce rotor speed and noticed that the engine was still running. He tried to execute a powered recovery by opening the throttle, noticing that the engine RPM needle came up to meet the rotor RPM, but it seemed unable to output any power to the rotors.

The pilot's recollection of the events now became hazy, but he believes he raised the collective to try to power the rotor system, but his attempts to do a power recovery distracted him from the rotor RPM which fell "dangerously low". The helicopter then entered what the pilot described as "freefall", accompanied by uncontrollable yawing and a high rate of descent. He decided that his only option was to obtain forward airspeed despite being close to the ground; he managed to achieve this together with a decreased rate of descent. The pilot, believing that the helicopter could not be recovered, now searched for the best place to do a run-on landing. The only option appeared to be in a large garden with trees at the rear and the touchdown was made there, still with considerable forward speed. The

helicopter ran into the trees and came to rest severely damaged, but the pilot suffered only minor injuries. There was no fire and he evacuated the aircraft without assistance: the emergency services attended shortly afterwards.

The engine was removed from the helicopter and, after inspection and replacement of three dented rocker covers, it was placed on a test bed and run. When subjected to a full pass-off test, no anomalies were found and it exceeded its rated power figure, comfortably passing the test. Fuel had been found in the carburettor when examined shortly after the accident.

Analysis

The fluctuations in the pitot-static instruments appear unrelated to subsequent events, beyond perhaps acting as a distraction for the pilot and increasing his workload. Information from the manufacturer suggests that such fluctuations are not uncommon and usually associated with water in the pitot-static system.

No defects were found in the engine or its accessories which could account for a loss of power. The pilot recalled fairly accurately the carburettor air temperatures at the time of the perceived engine power loss which suggests that it was out of the icing range. After the accident, the gauge was calibrated and found to be under-reading by 5°C at +10°C true temperature: it is not known whether this was as a result of impact forces but highlights the recommended practice of cross-checking the carburettor air temperature gauge with the outside air temperature gauge prior to engine start on the first flight of the day. If the gauge had been misreading during the flight then an indicated temperature of +12°C would have represented an actual temperature of +20°C.

What caused the engine to apparently lose power is not clear, although the ambient conditions were conducive to carburettor icing. It may be that the engine experienced the onset of carburettor icing which was eventually alleviated by the application of carburettor heat. If the pilot had let the airspeed decay during the period of reduced engine power and the subsequent attempt at a powered recovery from autorotation, he could have encountered the conditions for vortex ring. This would explain the aircraft's subsequent alarming behaviour, which was described by the pilot. It is also consistent with the observation that moving the cyclic forward not only increased airspeed but also decreased the rate of descent as the helicopter recovered from vortex ring. Photographs of the crashed aircraft and the accident site suggest that the touchdown was relatively gentle but with high forward speed. The pilot also made a verbal observation that during the ground slide he felt that he had tail rotor control; this suggests that the rotor system was under power at that time. It is thus possible that by the time the aircraft contacted the ground the engine had recovered to full or nearly full power.