Australian Government
Australian Transport Safety Bureau

Engine failure involving a Eurocopter EC120B, VH-JYV

Port Hedland aerodrome, Western Australia, 21 January 2014

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Aviation Occurrence Investigation
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Addendum

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Engine failure involving a Eurocopter EC120B, VH-JYV

What happened

On 21 January 2014, a pilot and check pilot were conducting a check flight in a Eurocopter EC120B, registered VH-JYV, at Port Hedland aerodrome, Western Australia.

The crew completed two simulated engine failures in the hover from about 3 to 4 ft above ground level (AGL), and a practice autorotation[1] into wind. The check pilot then briefed the pilot in command about the next manoeuvre, a 360° autorotation.

At about 1600 Western Standard Time (WST), when at about 1,500 ft above ground level, and overhead the runway 32 threshold, the check pilot stated that, on the count of three, he would reduce the throttle to idle. He counted to three and then reduced the throttle to idle and stated that they had a simulated engine failure. The pilot lowered the collective[2] and reduced airspeed, and entered the autorotation, simultaneously commencing a 360° turn. After about 3 seconds, passing through about 90° of rotation, the check pilot observed the (orange) 'GEN' warning light illuminate. He advised 'generator warning' and pushed the generator switch and attempted to restart the generator, without success, and the light remained on. The check pilot confirmed that the throttle was in the idle position. The (orange) fuel pressure light then illuminated and the check pilot advised 'fuel pressure warning' and selected the electric fuel pump on. The engine turbine continued to wind down and, when at about 800 ft AGL, the check pilot called 'engine failure' and simultaneously the (red) oil pressure light illuminated. The pilot continued the autorotation to the ground, with the check pilot assisting in the final stages. The helicopter landed smoothly, completing 360° of rotation, in the undershoot of runway 32, and no damage or injuries were sustained.

The check pilot then exited the helicopter and conducted a walk-around inspection, and found no damage or evidence of oil leakage or other mechanical fault. He then re-boarded the helicopter. As the helicopter was in the runway undershoot and two passenger aircraft were inbound to Port Hedland and about 5 NM away, the pilot attempted to restart the engine. The engine started normally, no warnings illuminated and all engine instruments indicated normal operation. The helicopter was fitted with a vehicle and engine multifunction display (VEMD), and all indications were normal.

The pilot then commenced a take-off and repositioned the helicopter to a dirt area away from the active runway and taxiways. The pilot kept the engine running and advised the airport fire services, aerodrome safety officer and Port Hedland aerodrome flight information service (AFIS) operator that no assistance was required and all operations were normal.

After idling the engine for about 15 minutes, with all systems operating normally, the check pilot again conducted an external inspection of the helicopter, with no abnormalities found. The pilot then relocated the helicopter to the company base helipad, recorded the engine flameout on the maintenance release and advised the senior base engineer of the incident.

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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.

Figure 1: VH-JYV

Source: Operator

Engine flameout restart procedures

The flight reference card (FRC) stated that there was a standard procedure for restarting the engine following a flameout in flight, providing sufficient altitude remained. As the helicopter was at about 800 ft AGL when the flameout occurred, the crew elected not to attempt a restart.

There was no directive preventing a restart following a flameout either on the ground or in flight. Prior to restarting (and repositioning) the helicopter, the crew carried out a thorough external inspection with no defects found and all VEMD engine system indications were normal.

Engineering inspection

The throttle twist grips were thoroughly investigated with the following findings: the idle stop markings were correct; the rigging confirmed as correct on both collectives; the fuel shut-off lock solenoid was functioning normally and could not be selected at the flight idle position and the twist grip inspection and modification had been carried out in accordance with Eurocopter Service Bulletin 76-007.

No defects were found in the chip monitor, fuel control unit or fuel injector and no fuel contamination was found. No faults were recorded on the VEMD.

A boroscopic inspection of the engine revealed burnt dilution tubes however these were deemed to be within normal limits by the engine manufacturer.

The engine manufacturer subsequently tested the engine and found no discrepancies that would explain the flameout.

Safety action

Whether or not the ATSB identifies safety issues in the course of an investigation, relevant organisations may proactively initiate safety action in order to reduce their safety risk. The ATSB has been advised of the following proactive safety action in response to this occurrence.

Helicopter operator

As a result of this occurrence, the helicopter operator has advised the ATSB that they are taking the following safety actions:

Flight Safety Instruction

The operator issued a flight safety instruction with the following requirements:

An incident must be assessed for its potential to have caused an accident. If an accident nearly occurred due to an aircraft anomaly, the aircraft is to be deemed unserviceable until advised by the chief pilot or engineering manager.

Any warning generated by the helicopter warning system or abnormal flight characteristics is to be discussed with the senior base engineer or engineering manager prior to continuing or commencing flight.

Safety message

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 subsequent autorotation often lead to accidents or serious incidents. The benefits of practice autorotations must be weighed against the risk of incidents during practice autorotations.

The company pilots in this incident had conducted two check flights per year on each aircraft type, with practice autorotations in each check. The successful completion of the autorotation highlights the benefits of the practice. Due to the risk inherent in conducting practice autorotations, some organisations are moving to conducting check flights in simulators where practical.

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

• 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:	21 January 2014 – 1630 WST	
Occurrence category:	Serious incident	
Primary occurrence type:	Engine failure or malfunction	
Location:	Port Hedland aerodrome, Western Australia	
	Latitude: 20° 22.67' S	Longitude: 118° 37.58' E

Helicopter details

Manufacturer and model:	Eurocopter France EC120B	
Registration:	VH-JYV	
Serial number:	1112	
Type of operation:	Flying training	
Persons on board:	Crew – 2	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.