

AAIU Report No. 1999/020
AAIU File No. 19980025
Published. 21/12/1999

Aircraft Type and Registration:	Hughes 269 C, EI-VIP
No. and Type of Engines:	1 Lycoming H10-360-D1A
Aircraft Serial Number:	211024
Year of Manufacture:	1982
Date and Time (UTC):	19 June 1998, 1825 hours
Location:	Loughshinny, Co. Dublin
Type of Flight:	Private
Persons on Board:	Crew - one Passenger - one
Injuries:	Crew - none Passenger - minor
Nature of Damage:	Beyond Economic Repair
Commanders Licence:	Private Pilots Licence (Helicopters)
Commanders Age:	45 years
Commanders Flying Experience:	3095 Hours (including 22 hours on type)
Information Source:	ATC Watch Manager, Dublin Airport. AAIU Field Investigation.

History of the Flight

The helicopter took off from the National Show Centre Cloghran, near Dublin Airport circa 1800 hours. The pilot was cleared by Dublin ATC to fly northwards to carry out an initial familiarisation flight with his passenger, who intended undergoing a helicopter flying course.

Prior to take-off the helicopter was fully refuelled, the meteorological forecast was obtained and given as CAVOK. The student was given a pre-flight brief, including emergency procedures. Before and after take-off checks were normal and aircraft routed initially towards Swords at 1000' and was then cleared northwards up to 2000'. All cockpit indications were normal for the first 20 minutes of the flight. Then, while on a southwesterly heading from Loughshinny Pier, the pilot felt a sudden shudder in his machine, there was a tendency to yaw to the left and within 1 or 2 seconds the engine RPM went to zero and the LV (low voltage) light came on. Simultaneously, the engine noise level reduced.

The pilot applied full low collective lever and entered autorotative flight. His priority was to maintain his airspeed within limits and to select an obstacle free landing area. The initially perceived landing areas, a field with a steep incline and one with numerous high tension cables were rejected as unsuitable, which left a ploughed field which was clear of livestock and wires. The pilot carried out the normal autorotation landing procedures into this ploughed field, i.e. flare, level and land.

Unfortunately, the cabbage and potato drills ran from his left to right and not parallel to the landing path, so that the aircraft skid undercarriage dug into the drills and tipped it over on its nose. Both pilot and passenger quickly exited through the pilot's door. There was no post crash fire. Emergency services were quickly on the scene and the pilot and passenger were brought to Beaumont hospital for observation. Following tests they were released later that night.

Meteorological Conditions

An aftercast was provided by the Irish Meteorological Service at Shannon Airport. The synoptic situation at 1825 hours on 19 June 1998 showed that the area lay in a light to moderate southerly - southwesterly airstream. A cold front over the west and northwest of the country was moving slowly eastwards.

At 1825 hours the weather was estimated as good with a visibility of 10+ km with cloud of 1 okta at 5000'. The surface temperature was 17°C with the freezing level at 11000'.

Comment: The helicopter was equipped with a fuel injection engine. Given the weather conditions at the time of the accident, icing of the induction system on an engine of this type must be considered to be only a remote possibility.

Engineering Investigation

Initial on-site inspection

The helicopter was lying inverted in a large field, one portion of which was planted in cabbage and another section planted in potatoes. The ground marks indicate that the helicopter touched-down, with significant forward speed, almost at right angles to the rows of cabbages, which were planted in drills. The skid undercarriage of the helicopter successfully traversed four cabbage drills. The right skid then came into contact with a fifth drill which was the last drill before the area of the field planted with potatoes. This drill was slightly higher than the other drills. The right skid dug into this drill, and the forward momentum of the helicopter caused it to tumble forward about its longitudinal axis. The helicopter finally came to rest in an inverted position.

The local Fire Service arrived on the scene shortly after the accident. Fuel was observed to be leaking from the fuel tank breather line. A member of the Fire Service crimped this pipe to prevent further fuel spillage.

The helicopter was shortly thereafter inspected by AAIU personnel, and the helicopter was then righted. Some fuel was observed to be leaking from the engine area. The main fuel valve could not be closed from the cockpit, due to distortion of the airframe, and the actuation cable was cut at the valve. This allowed the valve to be fully closed, and the fuel drip from the engine area then ceased.

Damage to the Helicopter

All three main rotor blades hit the ground as the helicopter inverted. At least two of the blades impacted with the tail boom, cutting the boom and causing the rear section of the boom, complete with the tail rotor and tail rotor gear box, to depart from the helicopter. One of the main rotor blades wrapped itself round the fuselage end of the tail boom. The cabin roof partially collapsed on the left hand side. The four point harness worn by both occupants did not fail. The helicopter suffered extensive damage.

Tests and Research

The helicopter was removed into Garda custody for the night and then to the AAIU facility at Gormanston the day after the accident. The engine and its controls were checked and no problem with the engine was found. In particular the following areas checked

- air filter and air passageways
- fuel filters and fuel piping
- magnetos and their timing
- engine compression
- general condition

As no cause of the stoppage was found it was decided to attempt to start the engine. There was still sufficient fuel in the tanks for this exercise. The engine started on the second attempt, and ran satisfactorily at idle power. It was not feasible to run the engine at normal operating speeds, due to the crash damage to the transmission system and rotors. The engine idled satisfactorily with either magneto turned "off"

A fuel sample was taken at the accident site. This was subsequently analysed and found to be standard Avgas, and to be free on water and any other contaminants.

As there was still no explanation for the stoppage, the engine was removed from the airframe, and sent to an approved overhaul facility, where it was mounted on a test bed, which permitted the full performance envelope of the engine to be tested. This work was done under AAIU supervision. Again the engine performed perfectly. In particular the engine performed within limits with each magneto switched off in turn, and also when fuel pressure was varied by a wide margin. A total of three hours engine running was completed in the test bed, and no possible cause for an in-flight stoppage was detected.

The two magnetos were removed, bench tests and strip-inspected. No defects, which could explain the stoppage, were found.

The fuel control unit was also removed and bench tested. It functioned close to the standard limits through the test range, and gave no indication of a cause for the stoppage. This unit was then shipped back to the manufacturers in the USA, where it was again bench tested, and also strip-inspected. This operation was supervised by an NTSB representative. Again these test revealed no explanation for the stoppage.

The magneto switch was removed and tested. No fault was found in the normal running setting. There was a slight tendency for the contacts of the left magneto to go "open" (i.e. live magneto situation) when the switch was jiggled in the "off" position. This however could not cause the inflight stoppage of the engine. The indent on the magneto switch was found to be positive, indicating that auto movement of the magneto switch to either the "off" or single magneto position was improbable. The magneto switch was then strip inspected and was found to be in good condition. The magneto wiring between the magnetos and the switch was also checked and found to be in good condition and free of electrical shorts or abrasion damage.

Other Information

Both the pilot and the passenger heard the engine making noise after they exited the upturned helicopter on the ground. The pilot believed that this noise was made by the starter solenoid engaging, probably due to impact forces. He re-entered the helicopter and turned off the master switch and the noise stopped.

Some time after the initial examination of the aircraft, it was brought to the attention of the investigation that the electric fuel pump was changed a few days before the accident. The pump was changed because of a report by the pilot of low fuel pressure indication when the pump was switched on. A new pump end motor assembly was then fitted. Following receipt of this information, the pump was inspected by the AAIU, and found to be correctly installed. The flow rate through the pump was found to be satisfactory. Even with the pump motor turned off, a flow rate of 45 gallons per hour was noted, which is satisfactory for this aircraft. It may be noted that the flight manual permits operation of the aircraft above 500 feet with the electric fuel pump selected to "off". It is therefore concluded that this pump was not a factor in this accident.

Conclusions

1. There was adequate fuel on board.
2. Inspection and test of the engine, its accessories and the helicopters fuel failed to reveal any defect that might explain an inflight stoppage of the engine.
3. The four point harness worn by the crew was instrumental in preventing serious injury in this accident.
4. No final conclusion can be reached as to why the engine stopped when it did.

Note: This report sustains no recommendations.