Aviation Safety Investigation Report 198901543

Hughes 369HS

20 May 1989

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NOTE: All air safety occurrences reported to the ATSB are categorised and recorded. For a detailed explanation on Category definitions please refer to the ATSB website at www.atsb.gov.au.

Occurrence Number: 198901543 **Occurrence Type:** Accident
Location: "London Bridge" 5 km W of Port Campbell VIC
Date: 20 May 1989 **Time:** 1445
Highest Injury Level: Fatal
Injuries:

	Fatal	Serious	Minor	None
Crew	1	0	0	0
Ground	0	0	0	-
Passenger	1	0	0	0
Total	**2**	**0**	**0**	**0**

Aircraft Details: Hughes 369HS
Registration: VH-MRU
Serial Number: 110278S
Operation Type: Private
Damage Level: Destroyed
Departure Point: Warrnambool VIC
Departure Time: 1417
Destination: San Remo VIC

Approved for Release: 12th December 1989

Circumstances:

The helicopter approached the "London Bridge" feature from the west along the coastline at about 400 feet above sea level. It then carried out a wide, right orbit of the feature and descended in an easterly direction as if to position the helicopter for the passenger to photograph "London Bridge" or perhaps to land in the car park. While facing east and still descending through an estimated 200 feet, almost above the feature, at slow forward airspeed, the helicopter began turning to the right without banking. The rate of turn accelerated rapidly. At about the same time an increase in engine noise was heard by witnesses who soon saw the aft section of the tail boom, encompassing the tail rotor assembly and stabilisers, separate from the helicopter. With the tail boom off, the helicopter adopted a steep nose down attitude as it rotated and plummeted. Witnesses estimate that the helicopter rotated through about six complete turns before it disappeared over the cliff edge. At the same time pieces were seen falling from the helicopter. In the soft rock on the lip of the cliff, about 65 feet above the sea, three distinctive rotor strikes were found. Two of the four main rotor blades were torn off at the blade grips probably when the blade tips impacted the cliff. These two blades were lost in the sea. At least one rotor blade hit the upper left rear of the fuselage, probably after striking the cliff. The air intake area, the structural members above the engine bay and the tail boom sustained massive impact damage consistent with main rotor strike(s). The outboard one third of the fourth blade appeared to have been broken off when the helicopter finally impacted hard in shallow, surging seas a few metres west of the cliff base. About three metres of tail boom was also lost in the sea. The fuselage, the rotor systems, the engine, the gearboxes, and the drive-train were examined by engineers. All damage was consistent with overload failure. Except for a small portion of the left rear door and remains of hinge assemblies, all four cabin doors were lost in the sea. The left rear door lower hinge pin was not found, nor was any remnant of the lower hinge bracket. It is unlikely that the hinge pin came out during the accident unless it had been inserted improperly. The only other alternative is that the pin was missing. The hinge pin incorporates a spring loaded bead near its tapered end and a safety tang at

the top to prevent it working upwards and out. No structural damage was found in the lower hinge cutout in the fuselage. In contrast, the upper hinge bracket on the left rear door failed through overload, consistent with the door having been thrust upwards about the upper hinge without restraint from the lower hinge, while the door was in the open position. A metallurgical study found that the upper hinge had also previously sustained a partial fracture which was probably present for a long time. The tail rotor blades showed evidence of having sustained impact damage in flight. The only portion of the door frame which was found displayed a dent as if it had been hit by a rotor blade. An indentation on the leading edge of one of the tail rotor blades was consistent with it having hit part of the door latching mechanism. Witnesses saw the tail rotor blades at about the same time that the helicopter began rotating to the right. This would suggest that the tail rotor blades had already slowed down considerably because at normal operating RPM the tail rotor is seen as a blurred disc. It is probable that the left rear door came off during the low speed descent and struck the main rotor blades which spin anticlockwise when viewed from above the helicopter. The door, or fragments of it, were probably flung into the tail boom and into the spinning tail rotor. The tail rotor drive shaft broke from overload, probably at the moment the door struck the tail rotor. Then the tail rotor would have slowed down rapidly due to aerodynamic drag plus the stub of drive shaft flailing within the tail boom. The fuselage would have begun rotating to the right because there was no longer any tail rotor thrust to counteract engine torque. Witnesses heard an increase in engine RPM, probably at about the same time as the anti-torque failure. This is consistent with a sudden removal of the engine load needed to drive the tail rotor especially during low speed flight. The aft section of the tail boom showed evidence of having been struck by a main rotor in flight. This could have come about by the affects of the door impacting the main rotors and disturbing their tip path plane or by the pilot losing control during the anti-torque failure. Once the tail boom separated, the change in the helicopter's centre of gravity would have been outside fore and aft cyclic control limits and the pilot would have lost control. After identifying the anti-torque failure, it is probable that the pilot instigated the rapid descent by entering autorotation in an attempt to carry out the emergency drill. A subsequent experiment with the slam shut doors, as were fitted to this helicopter, found that the rear doors could be slammed shut with minor difficulty despite the absence of the lower hinge pin. With all the latches properly adjusted, the door might remain shut in flight but its alignment may be slightly askew and the door would be more prone to open in flight. About twenty-five minutes before the accident, witnesses saw the left rear door open during the hover/taxiing phase at Warrnambool. The pilot landed the helicopter and shut the door before proceeding to "London Bridge".

Significant Factors:

The following factors were considered relevant to the development of the accident

1. It is probable that the lower hinge pin had not been inserted properly or was missing during the flight from Warrnambool.

2. The left rear door came off during a low speed descent and struck the main rotors and tail rotors which resulted in the tail boom failing.

3. The helicopter became uncontrollable in flight.