

## S2/2002 - Sikorsky S-61N, G-BBHM

<b>AAIB Bulletin No:</b> S2/2002	<b>Ref:</b> EW/C2002/07/03	<b>Category:</b> 2.1
<b>Aircraft Type and Registration:</b>	Sikorsky S-61N, G-BBHM	
<b>Serial Number:</b>	61713	
<b>Year of Manufacture:</b>	1973	
<b>Date &amp; Time (UTC):</b>	15 July 2002 at 1515 hrs	
<b>Location:</b>	Poole Harbour, Dorset	
<b>Type of Flight:</b>	Public Transport (SAR)	
<b>Persons on Board:</b>	Crew - 4	Passengers - Nil
<b>Injuries:</b>	Crew - Nil	Passengers N/A
<b>Nature of Damage:</b>	Helicopter destroyed	
<b>Commander's Licence:</b>	Airline Transport Pilots Licence (Helicopters)	
<b>Commander's Flying Experience:</b>	4,600 hours (of which 2,750 hours were on type)	
<b>Information Source:</b>	AAIB Field Investigation	

### History of the flight

The helicopter, which was based at Portland, was being operated in the Search and Rescue role by a commercial company on behalf of HM Coastguard. The crew came on duty at 0800 hrs on 15 July and completed serviceability checks on their respective equipment. This included the commander checking the aircraft and setting it up for a scramble start. No unserviceabilities were noted.

The crew received their first alert at 1425 hrs and were airborne, after uneventful engines start within five minutes. Their task was to look for a possible 'person in the water' in Poole harbour. During the subsequent search, the commander was handling the aircraft and maintained approximately 200 feet amsl with an airspeed of between 30 kt and 80 kt. The cabin sliding door was open and the winchman was seated in the open aperture with a safety harness. After about 40 minutes, the crew were requested to investigate reports of a vessel emitting a lot of smoke to the north of their position. From his location to the west of Brownsea Island, the commander headed 350° at 80 kt and at 200 feet amsl.

Shortly afterwards, the two rear crew members noticed an unusual noise and commented on this on their intercom. Almost immediately, the 'NO 2 ENG FIRE WARN' light illuminated accompanied by the audio alert. As the crew were completing the appropriate checks, smoke was seen to be

coming out, under pressure, from the area of No 2 engine exhaust; smoke was also seen in the cabin. The crew continued with the fire drill as the commander initiated a climb and a turn towards Bournemouth Airport, some 7 nm away. The sliding door was closed and an emergency was declared on the coastguard radio frequency. Following discharge of the extinguisher system, the fire light remained illuminated. Shortly after, the 'TRANS OIL PRESS' light illuminated on the caution panel accompanied by the 'MASTER CAUTION' light. By now the co-pilot had identified a suitable landing field to the left of the helicopter and called this to the commander's attention. The commander called "Immediate Landing" and this decision was transmitted on the coastguard frequency. As the commander established his approach to the selected sports field to the west of Poole, the 'PRI SERVO PRESS' light illuminated followed by the 'AUX SERVO PRESS' light. He was also aware of an uncommanded lateral movement on the cyclic control. On final approach, the co-pilot lowered the landing gear and also noted that the 'NO 1 ENG FIRE WARN' light had illuminated. Within the cabin, the smoke was becoming more dense as the commander made a successful landing on the sports field. After touchdown, the crew shut down No 1 engine and quickly vacated the helicopter. G-BBMH was destroyed by fire shortly after the crew were clear.

The crew of this helicopter were suddenly faced with a serious emergency followed shortly after by further indications of additional problems. However, all members of the crew carried out their duties very efficiently to enable the commander to carry out a successful landing in a period of approximately one minute from the initial onset of the emergency; this reflected extremely well on the individuals concerned and on their training.

### **Flight recorder information**

The helicopter was fitted with a combined cockpit and flight data recorder (FDR). This records the most recent five hours of data and one hour of voice information; all available data was recovered successfully and preliminary analysis has indicated that the time interval between onset of the original fire warning and touchdown was 80 seconds. The helicopter was also equipped with a Health and Usage Monitoring System (HUMS) recorder, which was destroyed by the fire and thus data for the accident flight was lost. However, historical data is available and will be subject to analysis. Work will continue to refine the information from the recorders.

### **Initial engineering information**

Shortly after the helicopter landed the fire took hold and, before the Fire and Rescue Services were able to extinguish it, some 75/80% of the helicopter had been consumed. After initial examination on site, the wreckage has been recovered to the AAIB at Farnborough. Preliminary indications are that the fire began in and around the No 2 engine, and there is some evidence of mechanical distress towards the rear of the No 2 engine in the region of the high speed shaft.

The initial findings of the engineering investigation conducted in the field are that a Thomas flexible coupling in the No 2 main drive shaft had run eccentrically, for reasons yet to be confirmed. Radial play was found at the Thomas coupling, and it is considered that this was associated with the No 5 engine bearing and/or the two couplings between the power turbine shaft and the main drive shaft. The resulting radial movement at the Thomas coupling had allowed it to come into contact with the tubular aft engine support in which the main drive shaft ran. As a result of this contact, the aft engine support had been progressively severed. This condition probably led to the release of engine oil into the area of the gearbox, and this is thought to be the cause of the fire in that area, as reported by the crew and witnesses. Both engines will be shipped as soon as

practicable to an overhaul facility in the UK where the AAIB, in conjunction with the engine and airframe manufacturer, will conduct a detailed strip examination.

The failure mode described has occurred on previous occasions and in 1988 another S-61, G-BEID, was lost in apparently similar circumstances. AAIB Report 3/90 refers.

The last major work in this area of the helicopter had been a Main Rotor Gearbox change carried out in November 2001 at 29754:40 hours TSN, about 100 hours before the accident. Since that time only routine minor maintenance had been carried out in the affected area.

## **Additional information**

### Helicopter

TSN	29853:55 at 14/7/02
LDGS 26465	at 14/7/02

### Engine

No 2 type	General Electric CT58-140-2
Serial number	295289
Year of manufacture	1980
TSN	13417:14 at 14/7/02
TSO	1562:58 hrs, 8002 cycles

## **Future Investigation**

The Chief Inspector of Air Accidents has ordered an Inspector's Investigation into the circumstances of this accident under the provision of the Civil Aviation (Investigation of Air Accidents and Incidents) Regulations 1996. Investigation will continue on engineering and operational aspects of this accident.