SERIOUS INCIDENT

Aircraft Type and Registration:	Sikorsky S-92A, G-SARC
No & Type of Engines:	2 General Electric CO CT7-8A turboshaft engines
Year of Manufacture:	2006
Date & Time (UTC):	9 July 2010 at 0950 hrs
Location:	Harris Hills, Isle of Harris, Scotland
Type of Flight:	Aerial Work
Persons on Board:	Crew - 4 Passengers - None
Injuries:	Crew - None Passengers - N/A
Nature of Damage:	None
Commander's Licence:	Airline Transport Pilot's Licence
Commander's Age:	47 years
Commander's Flying Experience:	8,982 hours (of which 653 were on type) Last 90 days - 51 hours Last 28 days - 25 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot

Synopsis

During a manually flown SAR mission, in mountainous terrain, the aircraft entered IMC. While attempting to exit these conditions on a pre-briefed escape heading with the autopilot coupled, the autopilot entered an unexpected mode that resulted in the aircraft not responding as intended. The autopilot was disconnected and the flight continued manually without further incident.

History of the flight

While carrying out a manually flown SAR mission in mountainous terrain the helicopter entered IMC. The commander, who was the pilot flying, called for the autopilot HDG (heading) mode of the automatic flight control system (AFCS) to be engaged while turning onto the pre-briefed escape heading. This was selected by the co-pilot on his mode select panel but it did not engage. The commander then asked for ALT (barometric altitude hold) mode and the minimum safe altitude to be selected in the altitude pre-select window. Initially, the co-pilot selected RADALT (radio altimeter hold) mode briefly, then selected ALT as requested. The co-pilot then selected HDG mode and set the heading bug to the helicopter's current heading. The commander then asked for the ALTP[1] mode, which the co-pilot attempted to select several times without effect.

Footnote

[1] ALTP climbs the aircraft to the altitude selected in the altitude pre-select window.

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Suddenly, while still in IMC, the autopilot appeared to enter a hover mode, which stopped any climb and increase in speed as the helicopter tried to enter a hover. The helicopter then adopted an approximately 15º nose up attitude with a small amount of bank, and descended. The crew saw HOV (automatic hover velocity) mode annunciated at the top of the Primary Flight Display (PFD) and the PFD went into the hover reference page. At this point a gap in the cloud revealed a hill in front of and below the helicopter. The co-pilot called for an immediate climb. The commander, who was flying with sole reference to instruments, immediately decoupled the autopilot and initiated a climb. He then called for HDG mode, which the co-pilot selected, and ALTP mode, which the co-pilot was again unable to engage.

The helicopter subsequently entered VMC over lower terrain. The SAR mission was completed and the helicopter returned to base without further use of the automatic flight control system modes.

Operator's comments

The helicopter manufacturer has assisted the operator in resolving issues highlighted by this event. Initially, the heading mode selection may not have engaged because the airspeed was below the lower capture limit of 50 kt. Additionally, cockpit design for the newer S-92A SAR variant of this helicopter is being reviewed, with regard to switch positioning and nomenclature, in order to reduce the opportunities for incorrect switch selection at times of high crew workload.

Safety action

Following this incident the operator took the following actions to standardise cockpit switch operation:

Autopilot engagement procedures have been standardised to include clear commands and execution instructions. This process has been incorporated into the revised Operations Manual and is being enforced during airborne and simulator training.

In recognising the occasionally sub-optimal switch locations and markings in the S-92A, the operator has adopted what it refers to as the "Locate, Mark, Select" principal which in both the helicopter and simulator, requires positive identification of any switch to ensure that, when activated, the result is as intended. The operator has also conducted flight tests in VMC to gain a better understanding of the AFCS modes that might have been engaged during this event.

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