

## Aerospatale AS350B Ecureuil, G-EJOC

<b>AAIB Bulletin No: 4/2004</b>	<b>Ref: EW/G2003/12/10</b>	<b>Category: 2 3</b>
<b>INCIDENT</b>		
<b>Aircraft Type and Registration:</b>	Aerospatale AS350B Ecureuil, G-EJOC	
<b>No &amp; Type of Engines:</b>	1 Turbomeca Arriel 1B turboshaft engine	
<b>Year of Manufacture:</b>	1981	
<b>Date &amp; Time (UTC):</b>	29 December 2003 at 1630 hrs	
<b>Location:</b>	Houghton, Norfolk	
<b>Type of Flight:</b>	Private	
<b>Persons on Board:</b>	Crew - 1	Passengers - None
<b>Injuries:</b>	Crew - None	Passengers - N/A
<b>Nature of Damage:</b>	Damage to tail rotor	
<b>Commander's Licence:</b>	Private Pilot's Licence	
<b>Commander's Age:</b>	69 years	
<b>Commander's Flying Experience:</b>	1,561 hours (of which 28 were on type)	
	Last 90 days - 5 hours	
	Last 28 days - 1 hour	
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot and subsequent AAIB enquiries	

### History of Flight

The pilot had previously landed and shut down the helicopter in a confined area bounded by trees on two sides and a house and lake on the others. In preparation for his departure the pilot had carried out a normal start and then commenced the after-start checks. These included two separate checks of the hydraulic system.

The first involved selecting the hydraulic test button on the central console with the collective lever remaining latched down, then exercising the cyclic stick. This has the effect of isolating the hydraulic system so that the flight controls are operated using the hydraulic pressure stored in the accumulators. This should allow normal control inputs initially, however if the controls are operated for more than a few seconds, hydraulic pressure is exhausted and the flight controls revert to a purely manual state, requiring a considerable increase in input pressure to operate them. The pilot completed this check satisfactorily before re-selecting the test switch to its correct pre-flight position.

The pilot then performed the second hydraulic check, which involved depressing the hydraulic isolation switch at the end of the collective lever. This has the effect of immediately and completely disconnecting the hydraulics from the flying controls, instantly reverting them to a manual state. Both

this check and the previous one result in a warning horn sounding and the 'HYD' caption illuminating on the central warning panel. These warnings remain active during the entire time that the hydraulic system has been de-activated. On satisfactorily completing the second check, the pilot re-selected the hydraulic isolation switch to restore normal hydraulic power. However he stated that despite doing so the 'HYD' caption remained illuminated on the central warning panel. He then re-cycled the switch twice more before he was able to clear the caption.

Having then completed the pre-flight checks, the pilot lifted the helicopter into the hover. Almost immediately he became aware of the controls becoming stiff and, looking down, he noticed the 'HYD' light was once more illuminated on the central warning panel. He stated, however, that the warning horn was not sounding. At this point he had positioned the helicopter partly over the lake as this was his intended direction of departure. With the controls now "hard" to operate the pilot was keen to get the aircraft back on the ground as soon as possible and so he tried to manoeuvre it back over the original landing site. This was a small confined area and in the process of re-positioning the aircraft, the tail struck some tree branches, damaging the tail rotor. Nevertheless, the pilot was able to land the helicopter safely and shut it down.

### **Analysis**

A subsequent engineering inspection found no faults with the helicopter. It therefore seems likely that at some point prior to takeoff, and without the pilot realising it, the hydraulic system had been disconnected from the flying controls.

The pilot stated that on trying to re-instate the hydraulics after the second check he had only waited for one or two seconds between each selection of the hydraulic isolation switch. It is likely that this was insufficient time for the system to come fully back on-line and therefore for the 'HYD' caption to clear. During this time the horn would have been sounding and whilst the pilot did not recall doing so, it is possible that he de-selected the horn to prevent it causing a distraction. When, finally, the pilot had managed to re-instate the hydraulics, he would then have turned the horn back on prior to takeoff. As the button required to do this is directly next to the hydraulic test button on the central console it is possible that it was the hydraulic test button that was operated instead. This would have resulted in the hydraulic pressure being exhausted, not immediately but after a small number of control inputs, which would be consistent with the pilot's statement that it was only shortly after takeoff that the problem became apparent. Under this scenario, since the horn button would not have been re-selected, this would account for the horn not sounding when the hydraulic pressure was lost. In addition the central warning panel would have displayed the 'HORN' and 'HYD' warnings prior to takeoff, but due to the position of the warning panel under the instrument panel glare-shield it is possible for these particular lights to be obscured, depending on the pilot's seating position. Thus, in the absence of any other indications, it is possible that the pilot had considered that all the correct selections had been made prior to takeoff when in fact the hydraulics and warning horn were turned off.

Having risen into the hover and realising that he had lost hydraulic pressure it is understandable that the pilot should wish to land again as soon as possible. The pilot has since remarked that it would have been better for him to continue his transition across the lake and to find a more suitable landing site nearby rather than to return to the restricted area offered by the original landing site. He also remarked that he had only practised hydraulic failures whilst in forward flight.

### **Conclusions**

The pilot probably had difficulty in re-engaging the hydraulic system because he allowed insufficient time before recycling the hydraulic isolation switch. Shortly after takeoff the helicopter lost hydraulic pressure with the 'HYD' warning caption lit but the warning horn remaining silent and no technical fault could be found to explain this. However, the circumstances reported were consistent with the horn being inadvertently selected OFF and the hydraulic test switch being inadvertently selected 'ON'. Moreover, it is possible that the relevant warning captions were illuminated but hidden by the

instrument panel glare-shield; the pilot's seating position requires careful attention to ensure all captions are visible. The pilot's attempt to land the helicopter in a confined area rather than fly to a more suitable site was due to his understandable desire to land as soon as possible, having found himself in an helicopter that was difficult to control.