Westland Gazelle HT Mk3, G-BXZE

AAIB Bulletin No: 1/2002	**Ref: EW/G2001/09/05**	**Category: 2.3**
Aircraft Type and Registration:	Westland Gazelle HT Mk3, G-BXZE	
No & Type of Engines:	1 Turbomeca Astazou 111 N2 turbine engine	
Year of Manufacture:	1974	
Date & Time (UTC):	3 September 2001 at 1800 hrs	
Location:	Hickstead Showground, West Sussex	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - None
Injuries:	Crew - None	Passengers - N/A
Nature of Damage:	Damage to fenestron, tail boom, tail fin and skids	
Commander's Licence:	Private Pilot's Licence (Helicopters)	
Commander's Age:	35 years	
Commander's Flying Experience:	480 hours (of which 180 on helicopters, 2 on type)	
	Last 90 days - 28 hours	
	Last 28 days - 10 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot	
	and further enquiries by AAIB	

The helicopter was lifting off from the western side of the International Arena at the Hickstead Showground for a flight to Selsey. The pilot reported that the wind was calm and he lifted to a hover about 6 to 8 feet above the ground. He began a left pedal turn to position the helicopter for transition over the open arena area to the east. As the turn approached 180° from the initial heading,

the pilot felt that he was unable to stop the helicopter turning left. The rate of turn began to increase rapidly.

After some 10 to 12 rotations, the pilot elected to land the helicopter immediately while still turning rapidly to the left. On touchdown, the right skid broke and damage was sustained during the rotational deceleration. The helicopter came to rest upright and the pilot shut down the engine before vacating the helicopter through the door on the right side, which had come open during the landing sequence.

The pilot reported that a witness on the ground had heard a 'bang' and a grinding sound when the helicopter was commencing its spot turn to the left.

Subsequent engineering inspection by the maintenance organisation found that the tail rotor transmission was still connected. The fenestron fairing was buckled and there was evidence that the tail rotor blades had contacted the inside of the fairing while rotating at operating speeds, but this probably occurred during the ground contact. No tail rotor blade failures were noted. There were also indications that a main rotor blade had made contact with the corner of the right side door. The engineer assessed that there was no mechanical failure noted that could have accounted for the accident.

An aftercast from the Met Office indicated that, at the time of the accident, the surface wind was from 270°T to 290°T at 4 to 10 kt, visibility in excess of 25 km, with few/scattered cloud at 2,000 feet or above. The temperature was +17°C. The upper wind at 1,000 feet was from 300°T at 13 kt.

Previous occurrences

The manufacturer's database contained a history of some loss of directional control events. These included six cases of maintenance related mechanical failure, three cases caused by improperly latched engine cowlings, two cases due to lack of bearing lubrication and one case of wrongly fitted tail rotor blades. Five cases of handling related losses of directional control were also recorded.

In the United Kingdom, several events have previously been reported in AAIB Bulletins. These reports are contained in Bulletin 4/84, G-SFTA accident on 7 March 1984, Bulletin 1/92, G-TURP accident on 9 September 1991 and Bulletin 2/98, G-BCHM accident on 5 July 1997 and G-HAVA accident on 28 July 1997. These Bulletin reports also contain additional background information relating to the loss of directional control incidents with the Gazelle helicopter type. With the recurrences of the problem highlighted, the manufacturer has issued two Service Letters to give appropriate advice to pilots.

Eurocopter Service Letters

Eurocopter has detailed the behaviour of the SA341/342 Gazelle series in the Yaw axis in Service Letters 1355-00-98 and 1518-67-01. In the latter, the following advice is presented:

> **'Reminders**
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> *EUROCOPTER remind you that in some configurations (hover flight, flight at low speed in light wind etc), starting a **turn** to the left can induce a high-rate turn if the pilot does not apply quickly the suitable position to the yaw pedal. If the pilot attempts to counter this high-rate turn by applying the amount of right yaw pedal*

that corresponds only to hover flight control, this is not sufficient to start actual deceleration, thus allowing the pilot to regain his bearings.

In this situation, right yaw pedal, and if necessary, full right yaw pedal, must be applied quickly, and held, to stop the turn to the left. Any delay in complying with this procedure will increase the time necessary to slow the helicopter. This effect is NORMAL and must not give rise to doubts as to the performance of the tail rotor. In all cases, the helicopter will stop turning.

*A **reminder** is also given that all **turns** to the left, in hover flight conditions or at slow speed, must be made applying moderate left rudder.'*

Additionally, the Ministry of Defence Gazelle (All Marks) Aircrew Manual, Advance Information Leaflet 1/93, contained the following information relating to loss of yaw control in the hover:

'In light wind conditions, an extremely rapid build up of yaw rate can follow a relatively small left pedal application during low speed flight or in the hover, particularly with the ASE disengaged. In this event, immediate and positive application of right pedal, up to the maximum, should be applied and maintained to arrest the rate of yaw. Recovery action may be ineffective if the pedals are returned only to the hover position, and the yaw rate may initially continue to increase before deceleration and an eventual steady hover is established. Furthermore, if the pedals are not returned as far as the original hover position, a steady hover will never be achieved and the aircraft will stabilise at a particular rate of yaw which may be very high. Pilots may misinterpret this as a loss of yaw control. Be warned that any delay in applying corrective action will require progressively larger right pedal inputs to achieve a steady state hover and may lead the pilot to believe that he has lost control. Yaw rates of up to 165° per second to the left can rapidly be arrested by applying full right pedal without any discernable loss of fenestron performance. In the hover and at low forward speeds, ensure that pedal turns to the left are always made slowly and smoothly.'

Certification Status

The Gazelle was originally an Aerospatiale design, with this particular model being built under licence for the UK military services by Westland. On completion of military service, a number of these helicopters were sold off by the Ministry of Defence. The military design specification for both airframe and engine is different to that of the civil certificated versions of the Gazelle (designated SA341G), so immediate civil registration and issue of a Certificate of Airworthiness was not a straightforward task, and conversion to the full certificated civil standard involved significant expense.

Consequently, several of these helicopters had applications lodged with the CAA to operate on a 'Permit to Fly' for private use only. The CAA Application & Certification section carried out a Special Survey, number 7311, in which was detailed the conditions under which each Gazelle could be issued with a Permit to Fly, dependant upon the results of an individual survey for each particular machine.

The CAA required that an E4/M5 approved maintenance organisation be appointed to handle each machine and would be responsible for ensuring that all applicable Eurocopter Service Bulletins and applicable Airworthiness Directives would be complied before each permit was renewed.