



**MINISTRY OF DEFENCE**  
**MILITARY AIRCRAFT ACCIDENT SUMMARY**

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**AIRCRAFT ACCIDENT TO ROYAL AIR FORCE PUMA HC  
MK1 XW227**

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AIRCRAFT:	RAF Puma HC Mk1 XW227
DATE:	16 March 2002
LOCATION:	Nr Jonesborough, Northern Ireland
PARENT UNIT:	230 Sqn, RAF Aldergrove
CREW:	Three, plus six passengers
INJURIES:	Four major, three minor

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Issued by: Directorate of Air Staff, Metropole Building, Northumberland Avenue, London WC2N 5BP



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**SYNOPSIS**

1. On 26 March 2002, Puma XW227 took off from Bessbrook enroute to a landing site on a hilltop near to Jonesborough. On approaching the landing site the pilot realised that the aircraft was flying too fast and too steeply to effect a landing, and attempted to overshoot. The aircraft struck the perimeter fence of the landing site, became entangled in the barbed wire and struck the ground, spinning several times before coming to rest. The Inquiry concluded that the accident was caused by a failure to adopt a sufficiently accelerative attitude during the attempted overshoot (i.e. if the helicopter nose had been pitched forward more steeply, allowing greater acceleration, the overshoot may have been successful). The helicopter crewman suffered minor injuries and the 6 passengers sustained injuries, ranging from major to minor.

## **BACKGROUND**

2. The Puma engine control system is not fitted with anticipators and, consequently there can be a lag in the engines' response to demands for power. During hard manoeuvring, the power required to maintain the speed of the main helicopter rotors decreases. To avoid the rotor blades being driven too quickly, the engines will automatically decelerate. If the engines decelerate to a sufficiently low RPM and a rapid power demand is subsequently made, the rotor speed ('N<sup>R</sup>') continues to decrease before the engines can accelerate up from idle. As the rotor blades slow, less lift is produced and the aircraft will descend. This is known as 'N<sup>R</sup> droop'. This phenomenon is well documented, and N<sup>R</sup> droop and droop theory are emphasised during training of Puma crews.

## **CIRCUMSTANCES**

3. Puma XW227 left Bessbrook at 1010 hrs on 26 March 2002 on a routine tasking sortie. The crew believed the wind to be westerly and the weather was suitable for the flight. A crew of 3 and 6 passengers (4 military and 2 civilian) were on board on arrival at the landing site. The aircraft captain flew a tight turn to approach the landing site and then realised that the aircraft was flying too fast and too steeply to effect a landing. He decided to overshoot, but the hard manoeuvring immediately prior to this decision caused N<sup>R</sup> 'droop'. The aircraft continued to descend and struck the wire fence surrounding the landing site. Due to a misappreciation of aircraft instrument windspeed indications and the lack of a windsock at the landing site, the final approach to land and attempted overshoot had unwittingly been flown downwind. Although the Puma instruments display a computed wind direction, the short transit prior to the approach had not allowed sufficient time for an accurate direction to be displayed. The downwind approach direction had exacerbated the steepness of approach and made the overshoot more difficult.

## **AIRCRAFT DAMAGE**

4. The aircraft was destroyed by the impact.

## **INVESTIGATION**

5. Although the Puma is not fitted with an Accident Data Recorder, all the crew were able to give accounts of the flight profile leading up to the accident, and video footage was available. The Board examined the wreckage, engines and flight instruments and was able to

discount technical failure. The Board used the Puma simulator to analyse the approach profile and determined that if a lower nose attitude had been used, the overshoot may have been successful. The Board therefore concluded that the accident was caused by a failure to adopt a sufficiently accelerative attitude during the overshoot. The Board concluded that the rotor response, approach profile, the lack of a windsock at the landing site and poor crew resource management were contributory factors to the accident.

#### **SAFETY RECOMMENDATIONS**

6. The Board recommended the investigation of improvements to the Puma engine control system, the installation of windsocks at helicopter landing sites (in South Armagh), and improvements to the passenger restraint systems on the Puma. Senior commanders have initiated action to introduce windsocks at appropriate helicopter landing sites (throughout Northern Ireland) and reviewed the regulations for protective equipment for passengers. The remaining recommendations are being pursued.

