



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

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**AIRCRAFT ACCIDENT TO ROYAL AIR FORCE HARRIER GR7  
ZG532**

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<b>AIRCRAFT:</b>	<b>RAF HARRIER GR7 ZG532</b>
<b>DATE:</b>	<b>14 July 1999</b>
<b>LOCATION:</b>	<b>2nm South East of Coldstream, Scottish Borders</b>
<b>PARENT UNIT:</b>	<b>3(F) Squadron, RAF Cottesmore</b>
<b>CREW:</b>	<b>One - Pilot</b>
<b>CASUALTIES:</b>	<b>One Minor</b>

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Issued by: Directorate of Air Staff (Secretariat), Ministry of Defence, Whitehall, London SW1A 2HB



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#### SYNOPSIS

1. On 14 July 1999 Harrier ZG532 was the Number 2 of a five-ship formation of Harriers, escorted by three Tornado F3s, conducting a fighter affiliation exercise against a further six Tornado F3s over Northumbria and the Scottish Borders area. Three miles east of Coldstream the pilot of ZG532 noticed a Tucano aircraft on a collision course at extremely close range, and initiated an emergency break manoeuvre to the left. During the manoeuvre, the aircraft departed from controlled flight. Once apparent, the pilot ejected sustaining minor injuries. The aircraft crashed in open farmland and was totally destroyed by the impact. The Tucano was undamaged and returned to base.

2. The RAF Board of Inquiry concluded that the cause of the accident was the violent departure from controlled flight of ZG532 at low altitude, during an emergency break manoeuvre initiated in order to avoid a collision with a Tucano aircraft.

### **BACKGROUND**

3. The exercise involved the Harrier aircraft remaining at low-level, whilst their three escorting Tornado F3s flew a few thousand feet above and a few miles ahead of them to protect them against any aggressive aircraft. The remaining six F3s, acting as the aggressors, would endeavour to get through the escorts' defences and 'destroy' the Harriers - a typical fighter affiliation scenario.

### **CIRCUMSTANCES**

4. The Harriers operated as 2 elements: the lead pair - Harrier Number 1 and ZG532 - were escorted by two Tornado F3s; the remaining Harriers and escort were 15 miles off the coast being targeted by the six aggressor Tornado F3s. The Tornado escorts of the lead pair broke away for a short time as the lead pair of Harriers flew on a westerly heading in a battle pair formation 2-3 miles apart. Just prior to the accident, the pilot of one of the Tornados told Harrier Number 1 and ZG532 that they were returning, and the lead pair's pilots watched the Tornados approach from the south.

5. Meanwhile, a Tucano from the Tucano Air Navigation Squadron (TANS) was on a reciprocal heading to ZG532 at the same altitude, following a navigation exercise route. The pilot of ZG532 saw an aircraft in his one o'clock position but initially assessed the aircraft to be a Jetstream and decided to manoeuvre left to maintain safe separation. However, he immediately realised that it was a rapidly approaching Tucano at an extremely close range. Knowing that a collision was imminent, the pilot of ZG532 initiated an emergency hard left to take avoiding action, during which ZG532 departed from controlled flight.

### **INVESTIGATION**

6. Analysis of the aircraft Accident Data Recorder established that ZG532 had been serviceable up to the moment of departure and that its handling characteristics had been normal. All crew members were looking out prior to the accident. The Tucano crew was concentrating its lookout on two Tornados that were a few miles to the south and slightly high; the two Harrier pilots were watching the same Tornados (their escorts) joining from the

south. The Board concluded that, although the crews were carrying out active lookout scans, this critically reduced the probability that the lookout scans of ZG532 and the Tucano crew would have been covering the area of the real threat. The Board also concluded that the difficulty of seeing a Harrier head-on against a terrain background, and the initial misidentification of the Tucano as a Jetstream were contributory factors in the accident.

### **AIRPROX REPORT**

7. The close proximity of ZG532 and the Tucano was also the subject of an investigation by the United Kingdom Airprox Board (UKAB). The UKAB Board concluded that the cause of the Airprox, which contained a very high risk of collision, was a late sighting of the other aircraft by each pilot. This was not a criticism of their lookout but was more a statement of fact.

### **SAFETY RECOMMENDATIONS**

8. The Board recommended:

- that all military low-flying aircraft should be installed with a collision warning system.
- that a study be carried out into the flight safety benefits from aircraft data links displaying aircraft proximity in order to reduce the risk of mid-air collision.
- that a review be undertaken of the handling advice for Harrier aircraft on high speed departure avoidance.

### **OBSERVATIONS**

9. Despite the loss of ZG532 in this accident, it was probably only the emergency manoeuvre by its pilot that prevented the loss of three aircrew lives and the Tucano, as the crew of the Tucano did not see the ZG532 in time to take avoiding action.