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## Severe turbulence, Boeing 777-236, G-YMME

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**Micro-summary:** This Boeing 777-236 experienced severe turbulence on approach.

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**Event Date:** 2003-07-03 at 0300 UTC

**Investigative Body:** Aircraft Accident Investigation Board (AAIB), United Kingdom

**Investigative Body's Web Site:** <http://www.aaib.dft.gov/uk/>

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## Boeing 777-236, G-YMME

<b>AAIB Bulletin No: 10 /2003</b>	<b>Ref: EW/G2003/07/10</b>	<b>Category: 1.1</b>
<b>INCIDENT</b>		
<b>Aircraft Type and Registration:</b>	Boeing 777-236, G-YMME	
<b>No &amp; Type of Engines:</b>	2 Rolls-Royce Trent 895-17 turbofan engines	
<b>Year of Manufacture:</b>	2000	
<b>Date &amp; Time (UTC):</b>	3 July 2003 at 0300 hrs	
<b>Location:</b>	10 miles north of KINDU, Central Africa	
<b>Type of Flight:</b>	Public Transport (Passenger)	
<b>Persons on Board:</b>	Crew - 15	Passengers - 247
<b>Injuries:</b>	Crew - 2 (Minor)	Passengers - 1 (Minor)
<b>Nature of Damage:</b>	Nil	
<b>Commander's Licence:</b>	Air Line Transport Pilot's Licence	
<b>Commander's Age:</b>	53 years	
<b>Commander's Flying Experience:</b>	17,440 hours (of which 3,655 were on type)	
	Last 90 days - 200 hours	
	Last 28 days - 70 hours	
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot and subsequent AAIB enquiries	

### History of flight

The aircraft was on a flight from London to Harare and was approaching the airway reporting point KINDU, situated over central Africa, at FL370. Some intermittent light turbulence had been encountered approximately one hour earlier whilst navigating around isolated storm activity, associated with the Inter Tropical Convergence Zone, but the aircraft had since experienced smooth flying conditions.

The captain (the commander) was in a crew bunk on his rest break whilst two first officers remained on the flight deck. Although it was dark, the operating pilots could see that they were clear of cloud due to the stars visible to them in the night's sky. Also, they were both monitoring the weather radar which showed no sign of weather activity affecting their route. With the flying conditions smooth and no indications of turbulence ahead, the seat belt signs had been off for some time. As it was night the lights in the cabin had been dimmed with most passengers attempting to get some sleep. Some of the cabin crew, particularly those in the rear galley, were however starting to prepare trolleys for the forthcoming breakfast service.

Suddenly, the aircraft experienced a small positive 'g' movement followed by a slight shake of the airframe. The passenger seatbelt signs were immediately switched on from the flight deck at which point the aircraft suffered a severe downward movement with associated negative 'g'. The operating pilots guarded the thrust levers and speedbrake in order to control the airspeed, however this remained constant throughout. The disturbance quickly stopped and the aircraft resumed its normal flight path, the flight conditions becoming smooth again. The seat belts signs were left on and over the next hour small amounts of clear air turbulence were experienced, although none were as severe as the initial encounter.

### **Injuries**

The aircraft's sudden downward movement resulted in one passenger, who had been seated at the time, striking her head and receiving a cut. Two members of the cabin crew working in the rear galley were also injured as both they and the catering trolleys they were preparing became airborne. Both suffered bruising and a degree of shock, whilst one also suffered cuts and abrasions. The passenger was treated using the aircraft's first aid kit and although medical assistance was requested on arrival, the passenger chose not to receive it. The injured cabin crew were taken off duty for the remainder of the flight and were seen by a doctor on arrival. He advised that they should continue to remain off duty until they returned to the UK for further assessment. Since the aircraft was carrying more than the minimum number of cabin crew this did not have an operational impact either for the remainder of the initial flight, nor for their subsequent return a few days later.

### **Analysis**

After the incident the captain spent some time discussing the likely cause of the turbulence with the two first officers. The lack of any aircraft showing on TCAS (Traffic Alert and Collision-Avoidance System) or broadcasting in their vicinity using the In Flight Broadcast Procedure suggested that the disturbance was not due to wake vortex. Similarly, in the absence of any marked change in temperature or wind speed and direction it seems unlikely to have been due to wind shear. The continued starlight suggested the aircraft had remained clear of cloud throughout the area of turbulence, although in the absence of a moon there had been insufficient light to be able to make out if there was any cloud below.

Whilst both first officers had been monitoring the weather radar at various ranges and tilt settings without seeing anything of concern, it was thought that the most likely cause was turbulence associated with cloud build up occurring some distance below the aircraft's path. This theory seemed to be upheld by the continuing clear air turbulence encountered over the following hour.

The weather forecast had not predicted any clear air turbulence in that area, but the captain pointed out that forecasts in the region were not always accurate. Indeed, the aircraft had had to hold for three hours at Harare waiting for fog to clear in order to land although, again, this had neither been forecast nor reported to them prior to their arrival.

### **Seat belt policy**

The captain stated that the company's policy is to advise passengers during the pre-departure cabin announcements to keep their seat belts fastened whilst seated, even if the seat belt signs are turned off. He believes this advice played an important role in preventing further injuries during this particular incident.