

**INCIDENT**

<b>Aircraft Type and Registration:</b>	i) Dornier 328-100, G-BZOG ii) Embraer EMB-135BJ Legacy, HB-JEA
<b>No &amp; Type of Engines:</b>	i) 2 Pratt & Whitney Canada PW119B turboprop engines ii) 2 Rolls Royce Allison AE3007-AIE turbofan engines
<b>Year of Manufacture:</b>	i) 1998 ii) 2002
<b>Date &amp; Time (UTC):</b>	1 February 2005 at 1650 hrs
<b>Location:</b>	Manchester International Airport, Manchester
<b>Type of Flight:</b>	i) Not applicable ii) Public Transport (Passenger)
<b>Persons on Board:</b>	i) Crew - 1                      Passengers - None ii) Crew - 2                      Passengers - 1
<b>Injuries:</b>	i) Crew - None                  Passengers - N/A ii) Crew - None                  Passengers - None
<b>Nature of Damage:</b>	i) Sharp cut in composite right wing tip leading edge ii) Superficial grazing of right winglet
<b>Commander's Licence:</b>	i) N/A ii) Airline Transport Pilot's Licence
<b>Commander's Age:</b>	i) N/A ii) 49
<b>Commander's Flying Experience:</b>	i) N/A ii) 6,100 hours (of which 1,100 were on type) Last 90 days - 90 hours Last 28 days - 40 hours
<b>Information Source:</b>	AAIB Field Investigation

**Synopsis**

The Embraer Legacy, with one passenger on board, was taxiing on the general aviation (GA) apron at Manchester International Airport. While moving forward slowly, with the assistance of a marshaller and two wing walkers, its right winglet struck the right wingtip of a parked Dornier 328. Separation of the aircraft revealed only superficial damage to the winglet and the Embraer was able to return to its base the following morning. The wingtip of the Dornier required replacement before further flight.

## **History of the flight**

When the Embraer Legacy arrived earlier in the day, the GA apron was empty except for a number of light aircraft, which were parked on its eastern edge. However, at 1600 hrs, one hour before the intended departure of the Embraer, a Dornier 328 arrived and partially blocked its path. Handling agent staff attempted to tow the Dornier clear, but a raised flowerbed at the edge of the apron prevented them from moving it more than a few metres.

After start-up, the Embraer taxied with the assistance of a marshaller, who walked ahead of the aircraft and communicated with the cockpit using hand signals. Because of the proximity of the Dornier on its right hand side, and light aircraft parked at the edge of the apron on its left, a 'wing walker' was provided at each wing tip in order to assist the marshaller in providing manoeuvring guidance to the captain. Although the co-pilot of the Embraer was able, with some difficulty, to see the right winglet out of the cockpit side window, the curvature of the window pane and wing sweep made an accurate assessment of wingtip clearance impossible from the cockpit.

Shortly after moving off, the marshaller signalled for the Embraer to turn left in order to increase the distance between it and the Dornier. During this manoeuvre, which increased the effective speed of the right wingtip, the right hand wing walker realised that the winglet of the Embraer would hit the wingtip of the Dornier and attempted to communicate this to the marshaller by raising his right hand in a 'halt' gesture to the marshaller. The marshaller raised both arms to the captain, who stopped the aircraft immediately, but not before the right winglet had struck the Dornier. The pilots of the Embraer shut the aircraft down. The captain of the Dornier, who was onboard his aircraft at the time of the collision, was aware of an unusual movement, but characterised it as less violent than a gust of wind and, when told of the collision, judged that the Embraer must have been moving very slowly on impact.

The tip of the Embraer's winglet had made a clean impact into the composite structure of the Dornier's wingtip. As a result, damage to the Embraer was limited to a small area of leading edge erosion tape, and some paint. There was no apparent structural damage. The wing tip of the Dornier was cleanly penetrated for a distance of approximately six inches but damage was confined to the composite tip fairing, and had not reached the structure of the tip, nor the electrical system installed in the wingtip.

## **Recorded information**

Recorded data from the flight data recorder indicates that at the time of the collision the Embraer aircraft was moving at a speed of 4 kt.

The apron and associated buildings are overlooked by a system of security cameras which record one frame every second. Footage from one of these cameras showed clearly the actions of the ground crew before and during the impact and confirmed their statement of events. It was not clear, however, if the marshaller or wing walker had at any time used conventional hand signals to indicate that the aircraft should stop, namely: repeatedly crossing the arms above the head at a speed which indicates the urgency of the stop.

A full description of the meaning of signals for the guidance of aircraft on the ground is given in CAP 393 *Air Navigation: the Order and the Regulations*, Rule 47 (Section IX, Table B). A more concise description is given in CAP 637 *Visual Aids Handbook*, chapter 6 'Aerodrome signals'; and in General Aviation Safety Sense Leaflet 6C '*Aerodrome Sense*'.

## **Conclusion**

The handling agent conceded that it is difficult to accommodate two large GA aircraft at once on the GA apron. Additional parking is available on a taxiway adjacent to the GA terminal and, if this is also full, larger GA aircraft are permitted to use sections of the nearby cargo apron.

It is pertinent to note that Rule 37 (2) of the Air Navigation Order states that:

*Notwithstanding any air traffic control clearance it shall remain the duty of the commander of an aircraft to take all possible measures to ensure that his aircraft does not collide with any other aircraft or with any vehicle.*

In this instance the commander of the Embraer aircraft, in conjunction with the marshalling team, developed a plan which he believed would ensure safe guidance whilst taxiing on the crowded apron: the collision occurred despite these measures.