

<b>Aircraft Type and Registration:</b>	Boeing 737-78J, YR-BGF	
<b>No &amp; Type of Engines:</b>	2 CFM 56 - 7B22 turbofan engines	
<b>Year of Manufacture:</b>	2001	
<b>Date &amp; Time (UTC):</b>	4 March 2004 at 1230 hrs	
<b>Location:</b>	Stand 214, London Heathrow Airport	
<b>Type of Flight:</b>	Public Transport (Passenger)	
<b>Persons on Board:</b>	Crew - 8	Passengers - 61
<b>Injuries:</b>	Crew - None	Passengers - None
<b>Nature of Damage:</b>	Damage to top of No 1 engine cowling	
<b>Commander's Licence:</b>	Airline Transport Pilot's Licence	
<b>Commander's Age:</b>	51 years	
<b>Commander's Flying Experience:</b>	17,000 hours (of which 1,900 were on type) Last 90 days - 200 hours Last 28 days - 60 hours	
	Note: the hours provided by the commander are approximate	
<b>Information Source:</b>	AAIB Field Investigation	

## **Synopsis**

When parking nose in to Stand 214 at London Heathrow Airport, the captain thought he was expected to use the AGNIS and mirror guidance system which had been turned on by the handling agents. However, as both the flightcrew and groundcrew were unaware that Boeing 737 aircraft required a marshaller in order to park on this stand (due to an inherent difficulty in seeing the STOP mark in the mirror), the aircraft was taxied forward by the commander. Also, as a result of a previously unnoticed problem, the correct nosewheel stop mark was obscured in the mirror, from the left seat pilot's position, by an aircraft tug which was parked in the designated area adjacent to the stand. The commander, however, could see the end of the centreline marking, which took the form of a T and adjacent to which were some chocks, and assumed that to be the correct point at which to stop. Although the emergency stop light had been illuminated by the groundcrew, this was not in the commander's field of view when looking at the mirror to his left. As a result, the upper part of the No 1 engine cowling made contact with the stand jetty. Five safety recommendations are made to the Airport Operator.

## **History of flight**

The aircraft had landed in good weather on Runway 27L at 1215 hrs after an uneventful flight from Bucharest. On vacating the runway the crew were cleared by ATC to taxi to Stand 214, their allocated parking stand. At this time, and unknown to the flight crew, no personnel were immediately available to marshal the aircraft onto stand, as required by the Airport Operator for B737 aircraft. In the absence of a marshaller, and with no indications to the contrary, the groundcrew had turned on the stand's guidance system. On approaching the stand the commander, who was also the handling pilot, could see that the AGNIS lateral guidance system had been switched on and that a member of groundcrew was waiting in the parking area with a pair of wheel chocks. This indicated to him that he was intended to park using the AGNIS and mirror.

The aircraft turned onto the stand and the commander used the AGNIS guidance system to line the aircraft up with the stand's centreline. Once the aircraft was correctly aligned he switched his attention to a pair of large mirrors to his left in order to monitor the position of the nose wheel in relation to the expected STOP mark. The commander was however unable to see a defined STOP mark although, as the aircraft progressed forward, he could see the end of the centreline marking in the mirror. This took the form of a T, next to which he could see the chocks. The commander stated that he therefore assumed that this was the correct parking position and continued to taxi slowly forward, intending to stop the aircraft when the nosewheel reached this mark. The commander then became aware of the aircraft encountering resistance to its forward motion and on looking up could see the emergency STOP light had been activated. The commander realised that the aircraft had come into contact with the stand's passenger jetty and immediately applied the brakes, before shutting down the engines.

## **Heathrow Stand Guidance Systems**

A range of guidance aids are used to provide correct alignment with the different stands and to indicate when the aircraft has reached the correct stopping point. These are described briefly below.

### *Azimuth Guidance For Nose In Stands (AGNIS)*

Two closely spaced lights which illuminate different combinations of red and green lights to indicate the aircraft's position relative to the centreline. They are mounted in a box at cockpit level at the end of the stand, aligned with the centreline.

### *Mirrors*

Large mirrors are positioned on the left at the end of the stand. They are aligned to allow the pilot in the lefthand seat of an aircraft to see the position of the aircraft's nosewheel relative to a prominent STOP mark painted on the ground next to the stand's centreline.

### *Arrow*

A large arrow, visible from the left seat of an aircraft, is painted on the ground to the left of the stand. It aligns with the pilot's seat when the aircraft is in the correct position to stop.

### *Parallax Aircraft Parking Aid (PAPA)*

A large board is positioned to the right of the stand into which a horizontal slot has been cut. A vertical light can be seen through the slot which, when aligned from the lefthand seat of an aircraft with the appropriate mark on the front of the board for the aircraft type, indicates the correct stopping position.

### *Combined Laser and Radar Aircraft Systems*

These are automated units which monitor an aircraft's position on the stand by use of a combination of laser and radar. They provide the pilot with both lateral guidance and correct stopping point indication by means of a series of lights contained within in one single unit, positioned on the centreline at cockpit level at the end of the stand. Two types of this system are currently in use at London Heathrow Airport – APIS and Safedock.

### *Marshalling*

Appropriate guidance can be provided onto any stand using conventional marshalling by one or, depending on aircraft size, two suitably qualified operations staff.

### *Emergency Stop Sign*

A prominent sign placed at cockpit level at the end of the stand which illuminates red with the word STOP. It can be switched on by the groundcrew at any time the guidance system is active to indicate that the aircraft should stop.

At present there are 198 different parking positions available on the stands at Heathrow Airport. The breakdown of guidance systems in use is as follows:

AGNIS/MIRROR	10
AGNIS/ARROW	8
AGNIS/MIRROR/ARROW	7
AGNIS/PAPA	107
APIS/Safedock	22
MARSHAL ONLY	44

It is of note that in previous cases at this airport where aircraft have over-run stands, those involving AGNIS, PAPA and mirrors have been as a result of pilots misinterpreting the guidance information available to them. One over-run accident occurred, however, on a stand using APIS, where the accident was not thought to have resulted from misinterpretation of the guidance information, but rather a failure to act upon it.

### **Responsibility for the control of aircraft parking on stands at London Heathrow Airport**

*The airport operator, Heathrow Airport Limited (HAL)*

The airport operator is responsible for providing adequate guidance of aircraft onto stands. This is controlled through the Airfield Operations Safety Unit, which is responsible for checking that guidance aids are both calibrated and operating correctly. They also provide the personnel for marshalling aircraft onto stands where no guidance is available or where it is requested by an operator. Certain operators have contacted the airport operator, either directly or via their handling agents, with specific marshalling requirements for various stands. This was either due to a desire to position the aircraft to their own requirements or because their crews had experienced difficulties with the normal stand guidance provided.

*Handling agents*

Handling agents are responsible for turning on the appropriate stand guidance system, where fitted, and operating the emergency stop light if required. They do not provide any other marshalling instructions to aircraft parking on a stand. Handling agents are advised of restrictions with aircraft parking on stands due to unservicability of passenger jetties via the Staff Information System (SIS). This is a computerised system available to all handling agents which is controlled by the airport operator. Further information is published by the airport operator when necessary by means of an Operator's Safety Instruction (OSI). Handling agents retain these instructions and pass the information on to their staff. No readily available list, however, exists for handling agents and their groundcrew defining which type of aircraft can park on which stand and the type of parking guidance required.

### **Stand 214**

Stand 214 is available to aircraft of DC-10 size and below. With the exception of Airbus A300 and Boeing 767-300 aircraft, which must be marshalled, aircraft originally parked by use of AGNIS and a STOP mark reflected in a single mirror. However, it became apparent to the Airport Operator that it was not possible to calibrate the single mirror for use by all aircraft and an additional mirror was therefore added below the original one, calibrated for use by smaller aircraft. Having done this, there remained a problem for Boeing 737 aircraft, for which the correct stopping position was only just

visible, appearing at the very top of the lower mirror. It was therefore decided by the airport operator that a marshaller would be provided to park Boeing 737 aircraft on Stand 214. During this investigation, a further problem was identified with this stand which resulted from the location of a parking space for an aircraft tug adjacent to the stand. When occupied by a tug, the view from the cockpit in the left half of the lower mirror was obliterated, the very portion of the mirror in which the STOP mark appears for Boeing 737 sized aircraft. This problem had not been noticed and it is likely that when the lower mirror was calibrated, a tug had not been occupying the parking space.

### **Analysis**

In the course of this investigation no procedure was identified for the Airport Operator to notify directly either the aircraft or the groundcrew that a marshaller is not immediately available and that an aircraft should stop short of a stand to await his arrival. In the absence of any indications to the contrary, both the groundcrew and the flightcrew of YR-BGF had mistakenly believed that the aircraft should park on Stand 214 using only the AGNIS and mirrors guidance system. In addition, no one had realised that a tug occupying the equipment parking bay next to the stand obscured the view in the lower of the two parking mirrors. Unable to see the correct STOP mark, the commander had identified what he believed to be the stopping point at the end of the stand's centreline and had continued to taxi. The ground crew witnessed the aircraft over-running the correct stopping point and had immediately activated the emergency stop light. Unfortunately, at this point, the aircraft commander was concentrating on the two parking mirrors to his left and the emergency stop light fell outside his field of view. At the same time, the co-pilot was trying to attract the attention of the groundcrew to the right of the stand to confirm that the aircraft was in the correct position, and he therefore did not notice the stop light either. It was only when the aircraft stopped due to the top of the left engine cowling became stuck under the passenger jetty that the crew realised something was wrong.

### **Safety Recommendations**

London Heathrow Airport has considerable demands on space for parking both aircraft and ground equipment. The airport operator has actively sought to reduce the reliance on marshallers to park aircraft by the installation of a variety of stand guidance systems, but these systems vary in complexity and cost. Although the airport operator has stated their intention to use the Safedock system for stand parking on the new Terminal 5 at Heathrow, currently under construction, the problems associated with less sophisticated stand guidance systems, which partly led YR-BGF to collide with Stand 214, remain.

The following Safety Recommendations are therefore made:

**Safety Recommendation 2005-009**

It is recommended that Heathrow Airport Limited should provide information on each stand to enable the handling agents to be sure that the aircraft attempting to park is compatible with the guidance system installed.

**Safety Recommendation 2005-010**

It is recommended to Heathrow Airport Limited that when temporary restrictions apply, such as the requirement to use a marshaller when an aircraft is manoeuvring to park on a stand, an appropriate procedure should be developed to ensure that this information is made available promptly and clearly to all ground personnel associated with parking aircraft on such stands.

**Safety Recommendation 2005-011**

It is recommended that, in addition to the stop light at the end of each stand, Heathrow Airport Limited should also install an emergency stop light adjacent to any aid used by the pilot for alignment, or stopping, in such a position that, irrespective of which aid is being used, the light falls within the handling pilot's field of vision.

**Safety Recommendation 2005-012**

It is recommended that Heathrow Airport Limited should carry out a review of current guidance systems currently in use to ensure they provide adequate guidance for all aircraft types that are expected to use any particular stand, with particular reference to those stands where operators have already raised individual concerns.

**Safety Recommendation 2005-013**

It is recommended that Heathrow Airport Limited should carry out a review of parking facilities for ground equipment in the vicinity of aircraft parking stands to ensure that ground equipment does not interfere with the correct use by flight crews of the stand guidance system.