
Ground collision between Boeing 767 and Boeing 737-800, 5B-DBX

Micro-summary: This Boeing 737-800 collided with a Boeing 767 while being taxiied to parking.

Event Date: 2003-11-14 at 2326 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 737-800, 5B-DBX

AAIB Bulletin No: 6/2004	Ref: EW/G2003/11/11	Category: 1.1
INCIDENT		
Aircraft Type and Registration:	Boeing 737-800, 5B-DBX	
No & Type of Engines:	2 CFM 56-7 turbofan engines	
Year of Manufacture:	2003	
Date & Time (UTC):	14 November 2003 at 2326 hrs	
Location:	Manchester Airport, Manchester	
Type of Flight:	Public Transport (Passenger)	
Persons on Board:	Crew - 7	Passengers - 188
Injuries:	Crew - None	Passengers - None
Nature of Damage:	Damage to left upper winglet of the Boeing 737 and the right wing tip of a Boeing 767 (G-OBYC)	
Commander's Licence:	Airline Transport Pilot's Licence	
Commander's Age:	36 years	
Commander's Flying Experience:	8,200 hours (of which 515 were on type)	
	Last 90 days - 211 hours	
	Last 28 days - 67 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot plus a report from Manchester Airport	

History of the Flight

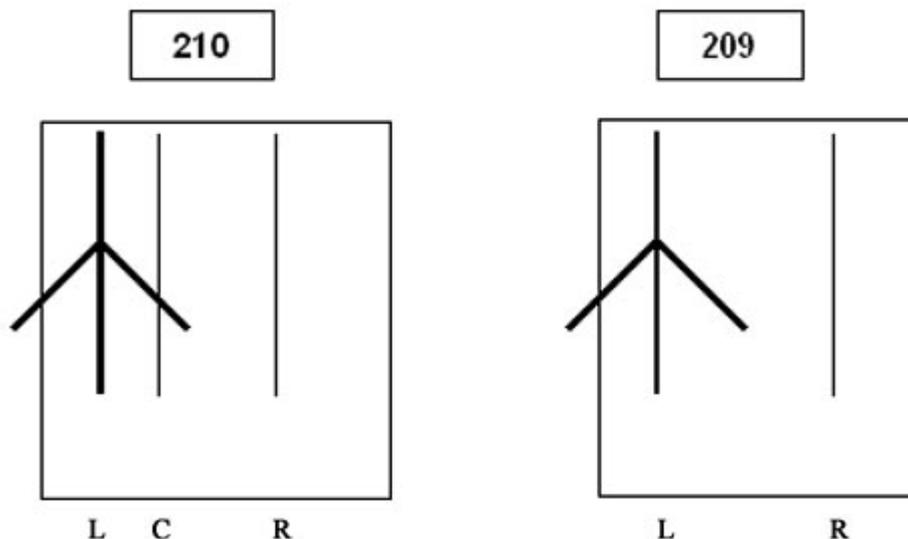
The aircraft had completed an uneventful transit from Larnaca Airport in Cyprus to Manchester Airport. Having landed, the pilots were instructed to park the aircraft on Stand 209L which is located at Terminal 2. Following the normal crew confirmation of the stand number, the aircraft approached the gate. The Stand Entry Guidance system (SEG) of Stand 209L was activated signifying clearance to enter the stand. Instructions from the Operational Support officer (OSO) operating the SEG system reflected the progress of the aircraft onto the stand. Just before coming to a halt and at about three knots groundspeed, the left winglet contacted the right wing tip of a Boeing 767 parked on Stand 210C on the left side of the aircraft. The aircraft was shut down and the passengers disembarked by the normal exit without further incident.

Control of the parking stands

At Manchester Airport the allocation of aircraft to stands is undertaken by two separate organisations. Terminals 1, 2 and remote stands are all allocated by a team of Airside Co-ordinators who report to the Terminal 1 Business. Stand Allocation within Terminal 3 is undertaken by one commercial operator. In order to assist in the allocation of stands, the Airside Co-ordinators utilise a computer system called ARIS. The computer is programmed with the parameters of all stands, including restrictions on aircraft size, type of traffic and individual airline preferences. A plan for the next 24 hours is produced to which the Airside Co-ordinators work; however this is not published and aircraft are only allocated publicly to stands once it is known that the stand is available. This requires the Airside Co-ordinator to approve a flight and the stand number is then promulgated automatically across the Airport via the AMOSS flight information computer system. In order to maximise the number of pier-served movements, part of the stand allocation plan may entail towing aircraft from a pier to a remote stand if they have a long turnaround. Likewise, remote stand parked aircraft may be allocated a pier-served stand for departure; this will entail an aircraft tow.

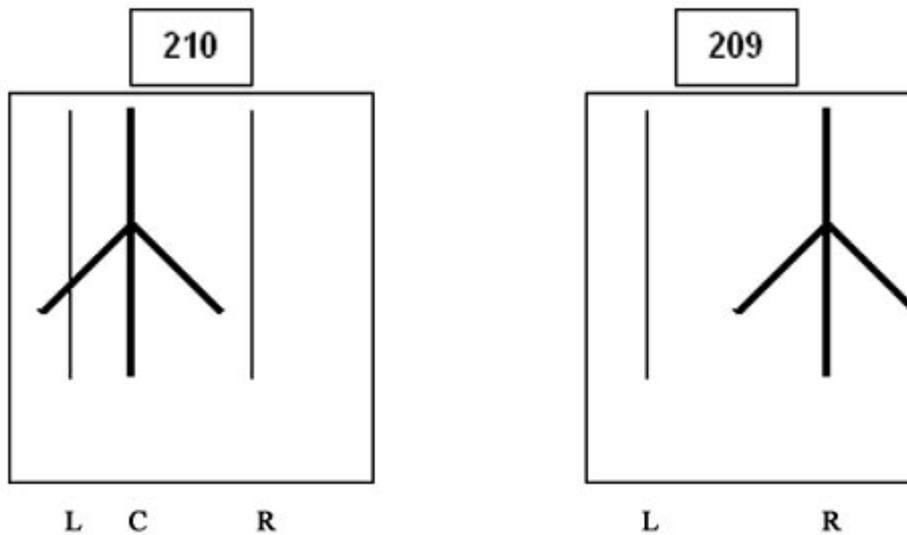
The Airside Co-ordinators will provide the relevant Handling Agents with a list of towing requirements at the start and end of their shifts and should also notify them of any changes which may occur. Should there be an attempt by an Airside Co-ordinator to allocate a stand incorrectly, for example placing an aircraft that is too large for a stand or has any adjacency restrictions, then the computer will immediately indicate that there is an incorrect operation. This is particularly important for stands on Terminal 2, as the way in which the centrelines interact is quite complex, with five separate centrelines being interdependent. Pairs of stands on Terminal 2 have interdependency. Typically a lower numbered odd stand (with two centrelines) will interact with a higher number even stand which has three centrelines. This means that a complex situation arises whereby five centrelines have an interdependency. However, the operating principles are reasonably straightforward, using Stand 209 and 210 as a typical example, the rules are set out as follows:

Figure 1



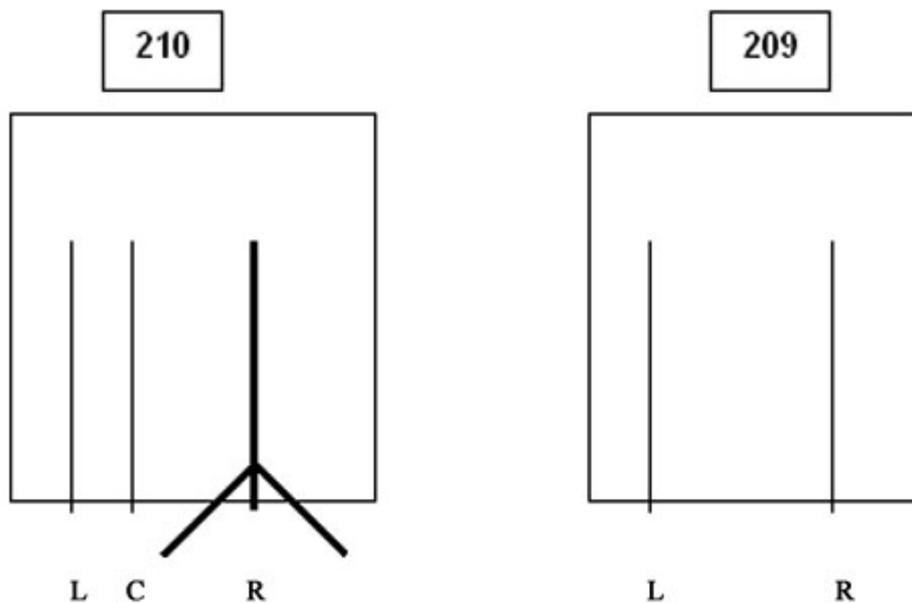
When the Left Centreline of each stand is occupied, this effectively blocks the use of all other centrelines. It should be noted that only this combination is allowed, ie 210C could not operate if 209L is used. Typically, maximum aircraft size for both 209L and 210L is the Boeing 757 (B757). It is also relevant that a Boeing 737-800H variant, that is a B737 with winglets has a greater wingspan than other B737 variants, and as such is treated as a B757 for the process of stand allocation.

Figure 2



When the even-numbered stand centreline is occupied, eg 210C, then the adjacent odd-numbered stand's right centreline should be used, eg 209R. Should 209L be used, then there is a compromise of wingtip clearance with Stand 210. Typically, the maximum aircraft size for 209R is a B737 (without winglets) and for 210C it is a Boeing 767 (B767).

Figure 3



The final example shows the use of the even-numbered stand right centreline, which could be utilised by a wide body aircraft, such as a Boeing 747 (B747). This would effectively close both stands and only Stand 210R could be occupied.

Stand Entry Guidance systems

The Stand Entry Guidance in use on Terminal 2 differs to that elsewhere on the airfield. The provision of azimuth guidance is by means of Azimuth Guidance Nose in Stand AGNIS, whereas stop guidance utilises a Traffic Light System. The system is not fully automated but requires the presence

of a member of staff to operate the stop guidance Traffic Lights, which is done utilising a hand-held control device located at Apron Level. It consists of three buttons pressed in sequence (Green - Proceed onto stand, Amber - Slow Down and Red - Stop). This function is presently undertaken by a dedicated team of eight Operational Support Officers (OSOs).

Analysis

Using the principles, above and applying them to the allocation of stands on the night of the incident, it is clear that to allocate an aircraft to 209L whilst 210C is occupied was not permitted. Consequently the wingtip clearance was compromised with the result that a collision occurred when the B737 taxied onto stand. The investigation has therefore concentrated on the events that led up to the incident.

Actions of the Airside Co-ordinator

The Airside Co-ordinator on duty on the night of the incident commenced his duty at 1830 hours for a 12-hour shift. It is not unusual for an Airside Co-ordinator to work alone on a night shift during the winter and the Airport Operator examined the Airside Co-ordinator's workload during its investigation. It was established that, having dealt with a total of 10 arrivals in the preceding hour, his workload was not arduous.

The ARIS stand plan to which the Airside Co-ordinator was working had already been produced before he started his shift. A copy of the plan is attached as Appendix 1 to this report. It clearly shows the B737 on Stand 209L. According to the plan, when it arrived on stand, a B757 was showing on the adjacent stand on 210L. This aircraft was planned to be towed off to Remote Stand 235 just after the arrival of the B737 at approximately 2330 hrs. The adjacency rules within ARIS allow this combination of aircraft (both on the left centreline) and as such, a conflict did not show on the ARIS screen. The B767 with which the B737 aircraft collided was planned to have been towed from Remote Stand 217 onto Stand 210C at 0310 hrs, some 2½ hours after the B737 had departed. Once again, a conflict alert on the computer system did not occur, as the two aircraft should not have been on the adjacent stands at the same time.

The Airside Co-ordinator was interviewed concerning his actions on the night regarding the allocation of stands and, more importantly, the information he provided to the Handling Agents regarding towing requirements. For clarity, the table below shows the planned times of aircraft movements, along with the actual timings of events. An accurate timeline of events was established using the ATC tape recording of the Ground Frequency as shown below.

Event	Planned Timings	Actual Timings
Arrival of B737	2320	2314
Removal of B757 from Stand 210L	2330	2230
Tow of B767 from remote stand to 210C	0310	2250

It is clear from the information in the table above, that the B757 was towed from stand one hour earlier than planned; in fact it had already departed by the time the B737 arrived. Similarly, the B767 was towed onto Stand 210C some 4 hours 20 minutes early, also prior to the arrival of the B737. The Airside Co-ordinator also indicated that he stand changed the B737 from 203L to 209L at around 2230 hours. This action was taken in order to ensure that the aircraft was in a more central location on the pier thereby improving Customer Service.

The Airside Co-ordinator informed the Handling Agent Ramp Allocator of the towing requirements at approximately 2230 hrs, after the arrival of their night shift. He told the Ramp Allocator that they could tow the B767 "sometime during the night". The Handling Agent Ramp Allocator thought that they were clear to tow the B767 once the B757 had been removed from Stand 209L. He had actually watched the movement of the B757 and immediately dispatched a crew to tow the B767 onto 210C. Clearly, whether the Allocator had been told to tow the B767 after the departure of the B757 or "anytime", the outcome is the same, in that this immediately has the potential for a direct conflict.

The Airside Co-ordinator was aware that the B767 when parked on 210C would conflict with the B737 on 209L. However, once he stand changed the B737 from 203L to 209L (noting at this point that the B757 was on 210L) he did not update the Handling Agent Ramp Allocator that there was now a potential for conflict. The aircraft tow should therefore have been delayed until after the departure of the B737.

Actions of the Operational Support Officer

The Operational Support Officer (OSO) on duty on the night of the incident was also working alone, but once again, that was not unusual on a night shift, in fact he dealt with only one movement in the hour preceding the incident. The arrival of the B737 was passed to him from the Airside Co-ordinator in ample time and at no point was he "rushed" in attending the arrival of the B737.

The Airside Co-ordinator activated the Stand Entry Guidance System on Stand 209L when he passed the aircraft to the OSO for docking.

On arrival the OSO checked the stand for debris, incorrectly parked equipment, etc. and deemed that the stand was in a fit state. At no point did he question the presence of the B767 on the adjacent stand, stating that he had often observed B767 parked next to B737 and this had not caused a problem.

As the B737 approached the stand, the OSO activated the docking system, pressing the Green button, thereby indicating to the pilot that he was clear to continue onto stand. As the aircraft proceeded down the line, the OSO became alarmed at the apparent close proximity of the winglet of the B737 to the wingtip of the B767. However, due to parallax he was unable to get a full perspective of the 'problem' so he started to step to the side in order to gauge the 'problem' more accurately. He finally became very alarmed, dropping the guidance box, which would have automatically turned the lights to red. However, this did not happen in sufficient time to avert the impact.

The OSO was not alarmed that he had been asked to dock an aircraft onto 209L when 210C was occupied because he was unaware that a B737 with winglets was to be treated as a B757 for stand allocation purposes. Had he been aware of these facts, he would have questioned the stand allocation of the B737 prior to its arrival.

The training records for the OSOs were examined and it was clear that training had been done 'in-house' with no formal records being kept. There was also no refresher training. This notwithstanding there was no training given concerning the interaction of stand centrelines on Terminal 2 so the OSOs would not be aware of any potential conflicts. It was, therefore, concluded that the lack of awareness and relevant training of the OSOs was a contributory factor in this incident.

Other Factors

The Airport Operator conducted an internal investigation, which considered other possible contributory factors related to the incident:

Weather

Although the night was dark and rain had recently fallen, the visibility on the night was considered to have been good. The stand is lit to CAP 168 standards and weather was not considered a contributory factor.

Equipment

The serviceability of the SEG on Stand 209 was checked and the records of its serviceability investigated. It was found to be fully serviceable and therefore not a factor in this incident.

ARIS Computer System

The stand allocation rules in ARIS for Stands 209 and 210 were also checked. The computer had been correctly programmed, and had the Airside Co-ordinator changed the timings of the tows to reflect his instructions to the Handling Agent Ramp Allocator, a conflict alert would have been initiated.

Towing Records

Unlike loaded sectors, empty tows are not treated as live pushbacks or 'on chocks' and no entry is made in AMOSS. Consequently, the Airside Co-ordinators ARIS screen only shows at what time a tow is planned, not at what time it actually happens or has happened. Often the Co-ordinator will visually spot when a tow is performed, and if so will 'confirm' it in the computer system, thus updating the screen. However, it is neither possible to see every stand on the airfield from the Operations Tower nor is it reasonable to expect the Co-ordinator to spot every tow that happens. The Airside Co-ordinator's screen is, therefore, a mixture of real time actual movements and off-line planned tow movements. It is recommended that the necessary changes be made to AMOSS and ARIS to allow real-time tracking of tows, as this will simplify the Co-ordinators job. This would not in itself, however, have prevented this accident.

Notification of the incident

The Ground Movement Controller was first made aware of the incident over the Ground Frequency when the B737 crew asked for confirmation of stand stating that they had collided with the wingtip of the adjacent B767 aircraft. Whilst this conversation was taking place, the Airfield Duty Manager (ADM) became aware that there was an incident following a report over the radio from the Operational Support Officer (OSO) who was responsible for providing docking guidance. The ADM proceeded directly to the scene of the incident. On his arrival it became clear that the left winglet of the B737 had become embedded into the right wingtip of the B767. Engineers of both companies arrived on the scene and all parties discussed means of separating the aircraft and a safe method of operation was agreed.

A Ground Incident was not declared because the commander of the B737 was satisfied with the attendance of the Airfield Duty Manager. It was clear on arrival at the scene that there was no need to escalate the situation as both aircraft were stable and in no way posed any threat to life.

The Tower Supervisor issued a Mandatory Occurrence Report and the ADM completed actions in accordance with the Airport's 'Notifiable Accident Reporting Procedures'.

Conclusions

The incident occurred because the B767 was towed onto Stand 210C ahead of the scheduled time of 0300 hrs at which it was due to be positioned. With the B767 on Stand 210C there was insufficient clearance between the wingtip of the B767 and the winglet of the B737. The parking of aircraft other than in accordance with the ARIS schedule removed the protections provided by the system.

Recommendations

The internal investigation identified a number of areas, which had contributed to the incident and so the Airport Operator decided to take the following corrective actions:

A formal training programme for the OSOs is being established, which will begin with training on the basic stand allocation rules for Terminal 2. Although not contributory towards this particular incident, formal marshalling training is also being established for all OSOs, which will include use of the Stand Entry Guidance on Terminal 2 and Marshalling skills in the event of a system unserviceability. The training will also include a refresher-training programme.

In the longer term, the role of the OSOs is being incorporated into Airfield Operations because it was considered that the OSO function is largely one associated with the Airfield since they are marshalling aircraft and providing docking guidance. It is anticipated that this function will transfer during April 2004. Because the Airfield Safety Unit has a full auditable training regime already in place, which is subject of annual inspection by the CAA, the transfer should then adequately address any training issues.

In addition to the changes proposed above, a draft procedure for informing the Airside Co-ordinators of towing aircraft is being created which entails the Handling Agents informing Airside Co-ordination that they are about to tow an aircraft. This will enable an OSO to be dispatched to check that the aircraft has been towed onto the correct line; it will also enable Airside Co-ordination to 'track' real-time tows of aircraft. This procedure is currently being discussed with the Handling Agents before implementation as a trial.