Airbus A310-308, C-FDAT

AAIB Bulletin No: 3/2004	Ref: EW/C2003/07/09	Category: 1.1
INCIDENT		
Aircraft Type and Registration:	Airbus A310-308, C-FDAT	
No & Type of Engines:	2 General Electric CF6-80C2A8 turbofan engines	
Year of Manufacture:	1992	
Date & Time (UTC):	15 July 2003 at 0655 hrs	
Location:	Stand 6, Manchester Airport, Manchester	
Type of Flight:	Public Transport (Passenger)	
Persons on Board:	Crew - 9	Passengers - 255
Injuries:	Crew - None	Passengers - None
Nature of Damage:	Considerable damage to an engine cowling	
Commander's Licence:	Airline Transport Pilot's Licence	
Commander's Age:	33 years	
Commander's Flying Experience:	8,735 hours (of which 960 were on type)	
	Last 90 days - 135 hours	
	Last 28 days - 59 hours	
Information Source:	Field Investigation	

Synopsis

Following a technical problem, the airbridge on Stand 6 at Manchester Airport could not be parked in the correct position. From the remote location of Apron Control, the stand allocator was unaware that Stand 6 was obstructed and so allocated it to an arriving A310 aircraft. Although, irrespective of the position of the airbridge, a marshaller was required to guide the aircraft on to the stand, the stand allocator also activated the Stand Entry Docking Guidance (SEDG) lighting. The marshaller arrived at the stand when the A310 was already manoeuvring to park and following the illuminated SEDG. Neither the aircraft commander nor the marshaller noticed that the airbridge was incorrectly parked until it was too late to prevent the upper surface of the aircraft's left engine cowling striking the underside of the airbridge as the marshaller signalled the aircraft to stop. Two safety recommendations are made which address control of the SEDG systems at Manchester Airport. A third safety recommendation is addressed to the CAA proposing an expansion of the UK aerodrome audit process to include the control and use of SEDG systems.

History of the Flight

The A310 aircraft had landed at Manchester Airport from Toronto in Canada and having arrived on schedule was instructed to park on Stand 6 attached to Terminal 1. This stand is served by a single airbridge and it was vacated at 0648 hrs by a Boeing 757 aircraft, seven minutes before the incident.

When the airbridge was retracted from the Boeing 757, a fault occurred preventing the facility from being moved into the correct parking position. The head of the airbridge was displaced 4.1 metres towards the rear of the stand where it was potentially an obstruction to aircraft using the stand. However, there was still sufficient clearance between the airbridge and the Boeing 757 to push back this aircraft safely. Once the Boeing 757 had been pushed back, the airbridge operator attempted to contact Terminal Control to report the fault using the telephone at the airbridge control position but the number was engaged. Consequently, he decided to report the obstruction to his supervisor who

was in the company operations room in the Terminal some five minutes walk away. He then left the airbridge and walked into the Terminal. The airbridge driver meeting the A310 arrived at the jetty in time to see his colleague trying to park the airbridge but subsequently the A310 taxied onto the stand guided by the marshaller.

An Airfield Safety Officer (ASO) was carrying out duties at Stand 44L when he was requested to attend Stand 6 in order to marshal the arriving A310 which had landed at 0649 hrs. The ASO made his way to Stand 6 travelling along the apron road and taxiway during which time he noticed the A310 holding, waiting to cross Runway 06L. As he passed Stand 10 the ASO saw passengers walking under the wing of another aircraft in an unsafe manner and so he intervened to ensure they were appropriately escorted. He became aware of the A310 passing behind him and he made his way to Stand 6, arriving as the aircraft was turning on to the stand.

The aircraft commander saw the SEDG was illuminated and so, in accordance with standard operating procedures, he turned onto the stand following the guidance. The ASO, having parked his vehicle, immediately commenced marshalling the aircraft onto the stand and the aircraft commander, having seen the marshaller, followed his signals whilst monitoring the guidance. The marshaller then saw that the airbridge was out of the normal parking position; it was extended and in line with the aircraft's left engine. He signalled for the aircraft to stop but before it did so, the top of the engine cowling struck the underside of the airbridge, damaging the cowling surface over a length of about 1.5 metres. The commander did not feel or hear any indication of the engine cowling striking the airbridge but he stopped the aircraft when instructed. It stopped 2.8 metres short of the normal parking position.

Aircraft parking procedures

Manchester Airport has three main passenger terminals with associated parking stands and their SEDG equipment. Terminal 3 parking is managed and allocated by a single major airline but the stands for Terminals 1 and 2 are allocated by Apron Control from a tower on the south side of Terminal 1 that overlooks the aprons. The airfield duty manager and two controllers, one for each terminal, are located in the tower with landline and radio communications to manage activities on the parking stands.

When an aircraft is inbound, a computer system allocates a suitable stand based on aircraft type, anticipated turnaround time and the aircraft operator. The computer software does not determine whether the SEDG is calibrated for the aircraft type. This function is performed by one of the two controllers in Apron Control using colour coded tabular displays which have two functions: firstly the displays indicate whether a particular stand can physically accept an aircraft type and secondly, they indicate whether the aircraft can 'self-park' or must be marshalled into position.

Stand Entry Docking Guidance

Several different types of SEDG equipment are installed at Manchester and these differ depending on the terminal in their method of operation. Only at Terminal 2 can the SEDG be activated from ground level with the ability to illuminate the 'STOP' text on the SEDG as well as from Apron Control. No facility to activate the SEDG and 'STOP' signal from the parking area is provided at stands serving Terminals 1 and 3.

When a SEDG installation is not calibrated for a specific aircraft type, a marshaller is allocated by Apron Control to ensure the safe parking of the aircraft. However, at the time of this incident, irrespective of whether or not a marshaller was assigned, the SEDG was illuminated from Apron Control when the stand was allocated. Moreover, the SEDG lights remained illuminated unless the stand was reported as obstructed whereupon Apron Control would illuminate the 'STOP' signal.

The Stand 6 SEDG system was a combination of centreline guidance provided by AGNIS lights (Azimuth Guidance Nose-In Stands) and stopping position guidance provided by PAPA (Parallax Aircraft Parking Aid). On Stand 6 the latter used a vertically orientated fluorescent tube mounted in front of a board marked with white vertical lines annotated for different aircraft types. The board was marked with lines for the A300, B757 and DC10 aircraft types plus another vertical line marked

'OTHER TYPES'. There was also a prominent 'STOP SHORT' illuminated sign positioned above the Stand 6 identification board. This light is used to warn aircraft commanders not to taxi into the parking position, usually because the stand is obstructed. The sign is not normally or routinely illuminated and only the Apron Controllers in their tower were able to switch on this illuminated sign.

Stand clearance responsibilities

Whilst Apron Control staff have a good general view of the aprons, the task of confirming that a stand is clear of debris and obstructions is carried out by the handling agent's airbridge driver, the ground engineers meeting the aircraft and/or the marshaller if one is allocated. Although stand areas are monitored by CCTV cameras, these afford a general view of the areas covered and are not used for ensuring that stands are clear prior to activating the SEDG.

Terminal Control

Terminal Control manages the flow and activities of the terminal areas which includes the maintenance and serviceability of the airbridges. If an airbridge failure occurs prior to docking with the aircraft, the airbridge driver carries out a series of system checks in order to identify and possibly rectify the fault. The local 'Airbridge Training Manual' instructed airbridge operators that when an airbridge is confirmed as unserviceable, the fault should be reported by telephone to *'Terminal Control ext. xxxx and Apron Control Ext. xxxx/xxxx.'* (as written but excluding the actual extension numbers). The telephone numbers for both Control Rooms were placarded on the exit door from the airbridge to the ramp. However, no formal procedure was in place for Terminal Control to inform Apron Control if the stand was blocked. Such information had to be passed direct to Apron Control by the airbridge driver, the handling agent or the marshaller. Only marshallers were equipped with two-way radios to allow them to communicate directly with Apron Control and, if necessary, Ground Movement Control in the ATC tower. All other handling staff were expected to use a telephone to contact a Control Room.

Staff responsibilities

The Airport Operations Manual sets out the duties to be performed by staff operating as airbridge drivers and marshallers. The procedures require that these staff ensure that the stand is clear of debris and obstructions, and that the airbridge is parked with its wheels within the designated parking circle.

When a marshaller was allocated to a stand, he would ensure the stand was unobstructed before bringing the aircraft onto the parking area. If the area was not clear or the airbridge was not correctly parked, the marshaller would stop the aircraft short until the stand was safe for it to enter. Any failure of the SEDG would be reported as a first action to Apron Control and secondly to Terminal Control using a telephone. However, in an emergency a marshaller could use his radio to transmit a warning message either direct to Apron Control or on the Ground Movement Control frequency.

CAP 642, Airside Safety Management

Civil Aviation Publication 642 contains 'advice and guidance' for airside operations and Appendix B provides a '*Model Safety Instruction - Operation of Visual Docking Guidance System'*. This appendix represents a model instruction for a notional airport, which may be modified to suit the actual arrangements at an airport. The CAP acknowledges that the information may not necessarily be appropriate at any particular aerodrome. In paragraph 3, two procedures are proposed covering how the SEDG equipment should be operated.

(Note: in the generic form used within CAP642, the system called SEDG at Manchester Airport is described as VDGS, meaning Visual Docking Guidance System and VDE, meaning Visual Docking Equipment.)

> 3.1 The system is *switched on by an airline or handling staff. In the case of airbridge served stands, one set of VDE control switches are mounted in a panel in the airbridge cab; a second set of switches are mounted in a conspicuously marked panel in a prominent position at the head of the stand. Either set of switches will operate the equipment and on all pier served*

stands timer switches are used which automatically switch off the VDE after 10 minutes. On non pier served stands a single set of switches is provided, mounted on a conspicuously marked panel at the head of the stand; the VDE on these stands do not have timer switches and the VDE must be switched off when the aircraft is safely parked on the stand.

Airline or handling staff must ensure that the stand is unobstructed by vehicles or equipment and that the airbridge is retracted and correctly parked before the arrival of the aircraft and before switching on the VDGS. Switching on the VDGS signifies to the aircraft commander that these actions have been completed and it is safe for the aircraft to enter the stand. Once the VDGS has been switched on, the person responsible for stand safety and VDGS operation must not leave the stand until the aircraft is parked, unless the VDGS is switched off again.

The two model procedures above ensure that the SEDG is not activated until the stand has been cleared of obstructions and staff either on the airbridge or at the stand can permit or prevent movement of the aircraft onto the stand.

Analysis

Although Stand 6 could accept an A310, because the SEDG was not calibrated for that type of aircraft, a marshaller was required to guide it into the correct parking position. Consequently, the dominant but latent causal factor for this incident was the routine practice of switching on the SEDG system in Apron Control even though the system was not approved for use by an aircraft type. The latency of this causal factor arose because pilots are entitled to follow SEDG lighting when illuminated but in this situation, safe parking of the aircraft depended on the marshaller arriving at the stand before the aircraft. In this incident he was delayed and arrived at much the same time as the aircraft when its commander was following the illuminated stand guidance. Had the SEDG been switched off, the commander would have been prompted to stop short of the normal parking position until given guidance by SEDG lights or instructions by a marshaller. However, there is still a risk of damage if a marshaller fails to arrive at a stand in sufficient time to check that it is clear of all obstructions, for the marshaller may attempt to park an aircraft in the normal position with unforeseen consequences. Therefore, it is important that marshallers arriving at a stand take sufficient time to check the stand for obstructions and debris before guiding an aircraft into the parking position.

In this incident, when the stand was obstructed by the airbridge, the airbridge driver attempted to contact Terminal Control on the telephone on the correct number, which he dialled from memory. However, even if he had succeeded in speaking to Terminal Control, there was no extant procedure that required Terminal control to inform Apron Control immediately and Terminal Control had no facility for switching any of the SEDG or 'STOP SHORT' lights. Consequently, the wording of the instruction to contact 'Terminal Control and Apron Control' was likely to prompt staff to contact Terminal Control first when the higher priority was to contact Apron Control first because they alone had control of the SEDG lighting. Moreover, as the AAIB investigation into a comparable incident (Boeing 747 9M-MPH reported in Bulletin 9/2001) made clear, time can be critical and a facility to switch on the 'STOP SHORT' sign in the airbridge and/or at ground level near the front of the stand is highly desirable.

When the airbridge driver discovered that the telephone extension in Terminal Control was engaged, he was not aware that the next aircraft to use Stand 6 would arrive almost immediately after the Boeing 757 had departed. Nevertheless, in the circumstances he would have more closely complied with the existing instructions to staff if he had tried to telephone Apron Control which had two telephone extensions. Had the airbridge been equipped with a switch for the 'STOP SHORT' sign, either of the airbridge drivers could easily have prevented this incident.

The ASO who was to carry out the marshalling, had seen the A310 holding to cross the runway and was aware there was limited time available to him. He had to deal with the incorrect movement of passengers at Stand 10 and then arrived at Stand 6 as the aircraft was turning onto the stand. Whilst the parking area appeared clear he did not at this stage notice that the airbridge wheels were parked outside the parking circle.

Conclusions

Six contributory factors combined to cause this incident:

1. Irrespective of whether an aircraft was allowed to self-park or required marshalling into position, Apron Control routinely switched on the SEDG lights.

2. The airbridge driver did not report to Apron Control that the airbridge was incorrectly parked and creating an obstruction on the stand.

3. The validity of the assumption in Apron Control that a stand was clear unless notified to the contrary was heavily dependent on telephone communications.

4. The instructions to staff regarding the reporting of stand obstructions were not optimised and the communication method was insufficiently robust to guarantee immediate contact with Apron Control.

5. The time pressure imposed on the marshaller by the additional task at Stand 10 meant that he did not properly check that the stand was clear of obstructions before marshalling the aircraft.

6. There were no controls for the SEDG or 'STOP SHORT' lights in the vicinity of the stand.

Airport operator's safety action

Following an internal investigation the airport operator has introduced a new procedure that when a marshaller is to be allocated to a stand, the SEDG will not be activated at any time. This will prevent an aircraft moving onto a stand before it has been properly cleared.

However, a hazard still exists for aircraft allowed to self-park on some stands. The hazard arises because Apron Control will routinely switch on the SEDG on the assumption that the stand is clear unless they have been notified to the contrary. As this incident shows, current methods for staff other than marshallers (who are equipped with radios) to inform Apron Control of an obstruction are far from robust. Moreover, at the stands serving Terminals 1 and 3 there is no immediate capability for staff at or near the stand to activate a STOP signal should it become necessary to do so. Therefore, two safety recommendations are made to address the immediate problems highlighted above and to establish an effective medium term solution which more effectively conforms with the advice and guidance contained in CAP 642.

Safety Recommendation 2003-131

Manchester Airport plc should ensure that Stand Entry Docking Guidance lighting is not activated by Apron Control until a positive communication has taken place with staff at the stand confirming that the stand is clear. Until the aircraft has parked and shut down its engines, those staff should remain available at the stand to inform Apron Control if the stand subsequently becomes obstructed.

Safety Recommendation 2003-132

For the airbridges and stands serving Terminals 1 and 3, Manchester Airport Plc should, within a reasonable timescale, fund and develop Stand Entry Docking Guidance lighting controls and associated procedures that comply with the advice and guidance contained in Civil Aviation Publication (CAP) 642.

Safety Recommendation 2004-08

The UK Civil Aviation Authority should consider including within future audits of UK aerodromes compliance with CAP 642 advice in respect of the control and use of Stand Entry Docking Guidance systems.

Safety Recommendation response

On 12 January 2004 a representative of Manchester Airport plc notified the AAIB that the airport accepted Safety Recommendations 2003-131 and 2003-132. Budgetary provision had been made for a programme of works and an investigation implemented into the engineering and electronic functions of the current Stand Entry Docking Guidance systems, encompassing all three Terminals, to define the scope of the proposed works.