

ACCIDENT

Aircraft Type and Registration:	1) Boeing 777-300(ER), HL-7782 2) Boeing 757-256, TF-FIK
No & Type of Engines:	1) 2 GE Aviation GE90 turbofan engines 2) 2 Rolls Royce RB211 turbofan engines
Year of Manufacture:	1) 2009 (Serial no: 37643) 2) 1999 (Serial no: 26254)
Date & Time (UTC):	28 September 2022 at 1850 hrs
Location:	London Heathrow Airport
Type of Flight:	1) Commercial Air Transport (Passenger) 2) Commercial Air Transport (Passenger)
Persons on Board:	1) Crew - 18 Passengers - 199 2) Crew - 6 Passengers - Unknown
Injuries:	1) Crew - None Passengers - None 2) Crew - None Passengers - None
Nature of Damage:	1) Left wingtip damage 2) Damage to the rudder
Commander's Licence:	1) Airline Transport Pilot's Licence 2) Airline Transport Pilot's Licence
Commander's Age:	1) 52 years 2) 55 years
Commander's Flying Experience:	1) 10,561 hours (of which 3,384 were on type) Last 90 days – 249 hours Last 28 days – 73 hours 2) 15,500 hours (of which 12,500 were on type) Last 90 days – 160 hours Last 28 days – 50 hours
Information Source:	Aircraft Accident Report Forms submitted by both commanders and further enquiries by the AAIB

Synopsis

Whilst taxiing for takeoff the wingtip of a Boeing 777-300 collided with the rudder of a Boeing 757 which was not fully parked on its stand. The commander of the B757 turned onto the stand centreline without stand guidance and did not inform the ATC ground controller that they were not fully parked, contrary to Heathrow Aeronautical Information Publication (AIP) instructions. The commander of the B777 taxied past the protruding B757 believing it to be fully parked and that the ATC clearance and green taxiway lights implied the route was clear. Previous similar incidents have occurred at Heathrow.

History of the flight

A Boeing 757 landed at 1843 hrs on Runway 27L at London Heathrow and taxied to parking Stand 241 at Terminal 2B. It was dark but visibility was good. As the commander turned the aircraft onto the stand centreline he saw that the stand visual docking guidance system (VDGS) was not on and, at 1848:05 hrs, stopped the aircraft approximately 20 m from the final parking position. The co-pilot called the ground handling agent on the radio and asked when the VDGS would be activated. The handling agent replied that marshallers were aware of their arrival and would be there “very shortly”. Several ground staff were waiting on the stand but they were not qualified to activate the guidance system. As the flight crew expected the guidance to be activated imminently and had informed the handling agent, they did not inform the ATC ground controller that they were not fully parked.

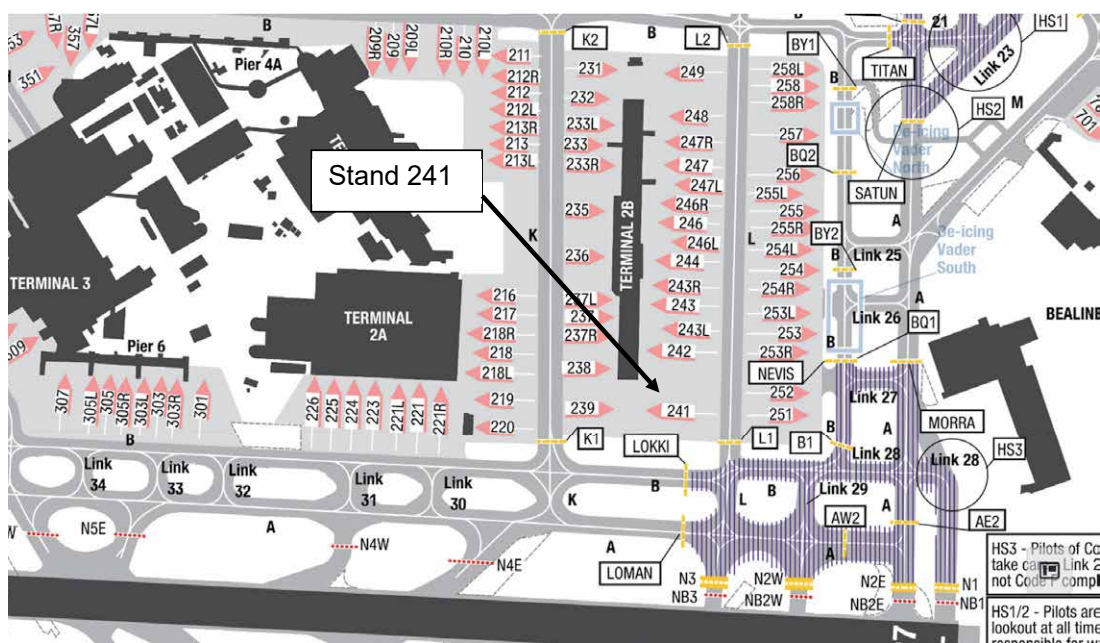


Figure 1

Heathrow Airport Ground Map

Concurrently a Boeing 777-300 was taxiing from Terminal 4 for takeoff on Runway 27R. It crossed Runway 27L and was cleared to “FOLLOW THE GREEN LIGHTS AND HOLD AT TITAN” which routed the aircraft along Taxiway Alpha then north on Taxiway Lima. As it made the left turn from Alpha to Lima the co-pilot saw the B757 on Stand 241 and told the commander it looked like it was protruding from the stand. The commander looked at the B757 but could not see an anti-collision light, so thought it was fully parked. He thought it was “quite close” but as ATC had not mentioned a conflict, he felt it was safe to taxi past. He reduced speed slightly and moved slightly right of the taxiway centreline, and continued to taxi north on Lima.

At 1853:56 hrs, as the B777 taxied past, the B757 crew felt a sudden jolt. They had been stationary for nearly six minutes. The B757 co-pilot looked out of his window and saw the B777 taxiing past, and the B757 pilots realised there had been a collision. The

commander called the cabin crew at the back of the aircraft to check if they were okay. The crew confirmed they had felt the jolt but they were fine and no one had been injured. The commander then informed ATC that they thought there had been a collision.

The B777 crew had not felt the collision and continued north on Lima. As they approached the northern end of Taxiway Lima, ATC instructed them to hold position and informed them of the potential collision. At the same time a passenger on the B777 told the cabin crew that they had seen the wingtip hit the other aircraft. The cabin crew passed the message to the flight crew at about the same time as ATC instructed them to stop.

Just prior to the collision, an airport operator leader vehicle had arrived on Stand 241 to marshal the aircraft. The driver saw the B777 pass behind but did not realise there had been a collision. He switched on the guidance system at about the same time as the collision occurred. After the B757 commander confirmed the crew were okay he taxied the aircraft forward to the final parking position.

ATC initiated the ground incident procedure and both aircraft were inspected. The inspection confirmed there was damage to the left wingtip of the B777 and to the rudder of the B757. The B777 was shut down on the taxiway and passengers were disembarked to busses and into the terminal. The B757 passengers disembarked normally.

Figures 2 and 3 show the damage to the B777 left wingtip. Figure 4 shows the damage to the B757 rudder.

Heathrow ground handling

On the day of the accident one of the tunnels used to access the central area at Heathrow was closed for several hours. During the closure a contraflow was in operation within the other tunnel. The ground handling agent reported that this caused several of their staff to be delayed getting to work. As the B757 approached Heathrow, due to these staff shortages the ground handling agent realised they would not have a dispatcher available to meet the aircraft and activate the stand guidance. The handling agent reported that it had a prior agreement with the airport operator that, in these circumstances, they would ask the airport operator to send a marshaller to the stand. The handling agent made the request to the airport operator when the B757 entered the Heathrow Terminal Manoeuvring Area, and the airport operator agreed to send a marshaller when able. The airport operator assigned the task to one of its leader vehicle drivers, and he proceeded to the stand as soon as he had finished his previous task, arriving just prior to the collision.

The airport operator reported that it did not have an agreement with any handling agent to provide marshalls in the event of staff shortages. It would only expect to provide a marshaller in the event of a failure of the guidance system as specified in the UK AIP entry for Heathrow. The airport operator also confirmed that other access points were available to staff so the tunnel closure should not have caused any staff to be delayed.



Figure 2
Boeing 777 left wing tip

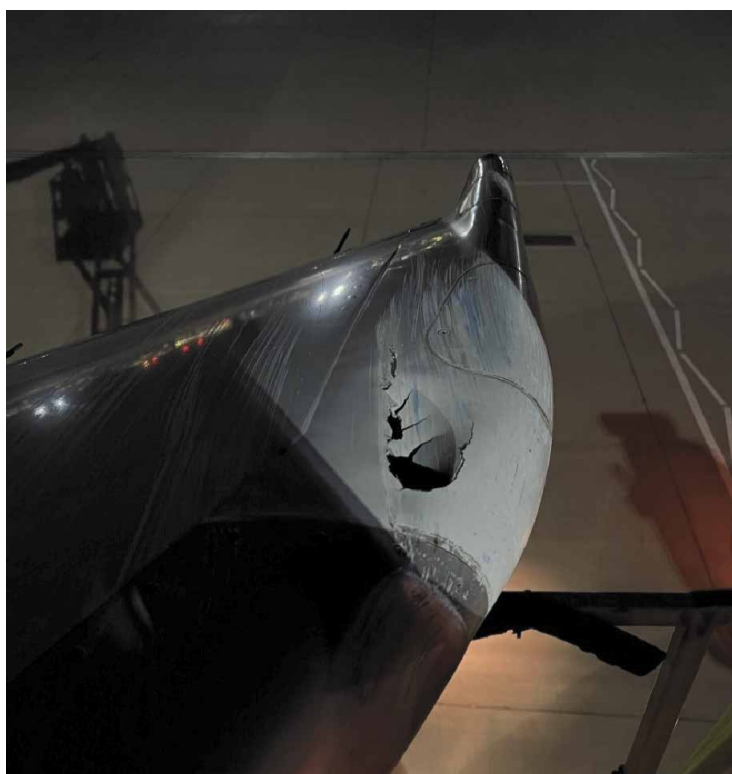


Figure 3
Boeing 777 left wing tip from above

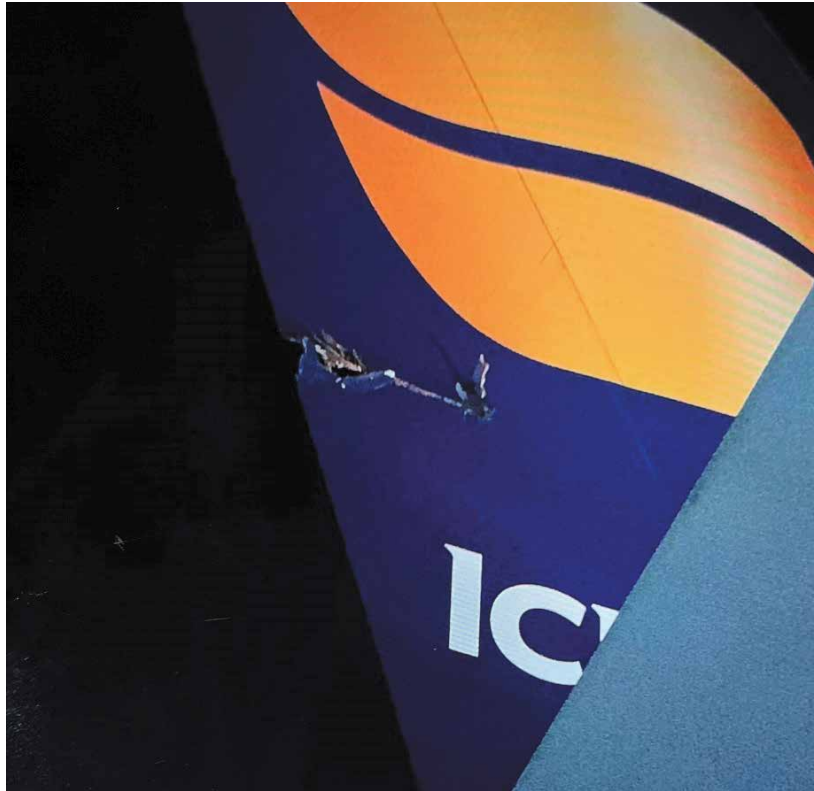


Figure 4
Boeing 757 rudder

Recorded information

The CVR and FDR were recovered from both aircraft. The FDR from both aircraft had data from the accident and the CVR from the B757 had a recording of the accident, but by the time the power was isolated from the CVR of the B777 the incident had been overwritten. The available recordings were used to confirm the history of flight.

Aerodrome CCTV and footage was obtained from the leader vehicle dashcams. This confirmed the B757 anti-collision light was on and working normally when the accident occurred. Figure 5 was created by the airport operator and shows the approximate position of each aircraft when the collision occurred.

Figure 6 shows radio transmission on the ATC ground frequency from the time the B757 stopped short of the stand to the time of the collision. Shortly after they stopped there were several periods of between 5 – 7 seconds when there was no transmission. The longest gap during the 6 minutes was 18 seconds.

A review of the CVR from the B757 during the time the aircraft was stationary on stand did not reveal any attempt to contact the ATC ground frequency or any discussion about contacting them until after the collision.

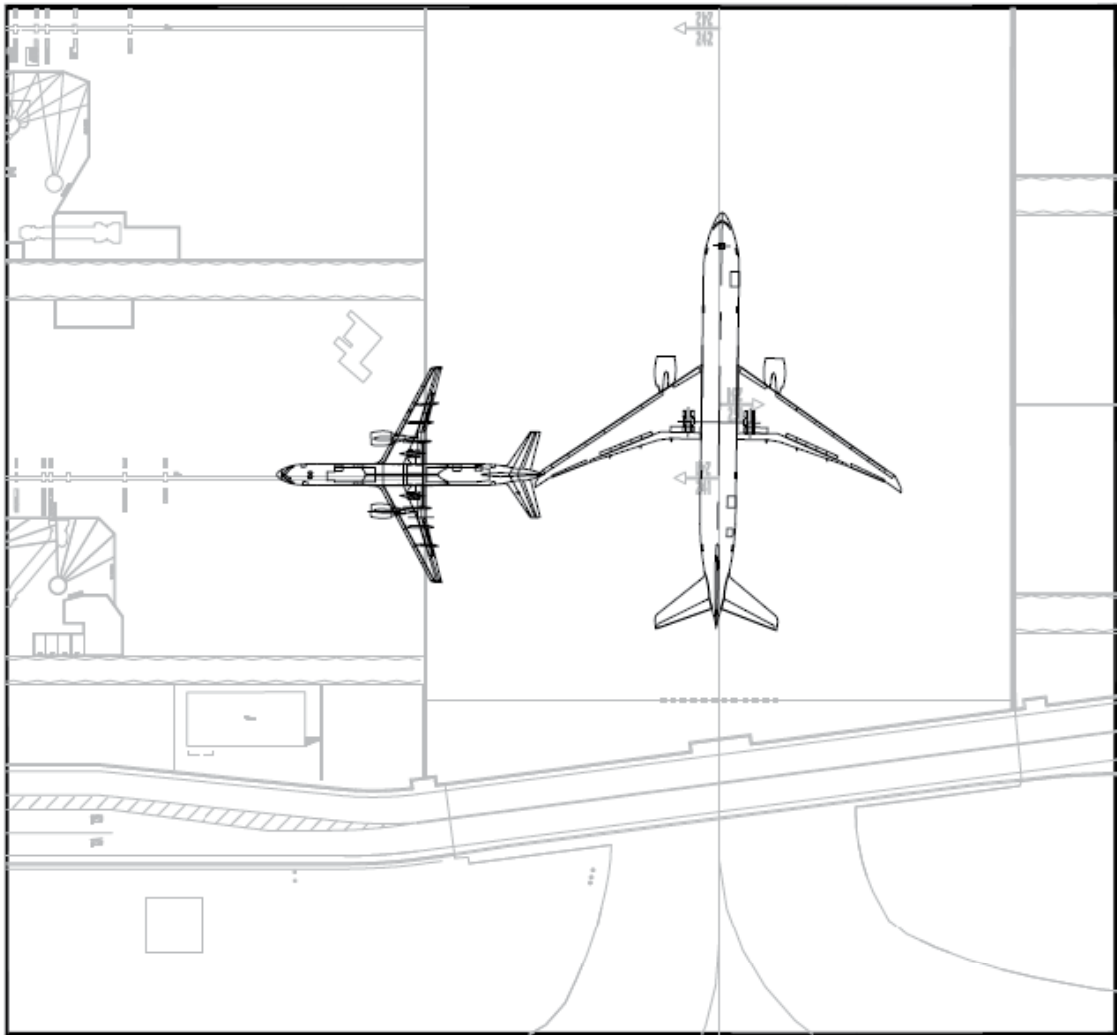


Figure 5

Approximate positions of the B777 and B757 when the collision occurred
(image used with permission)

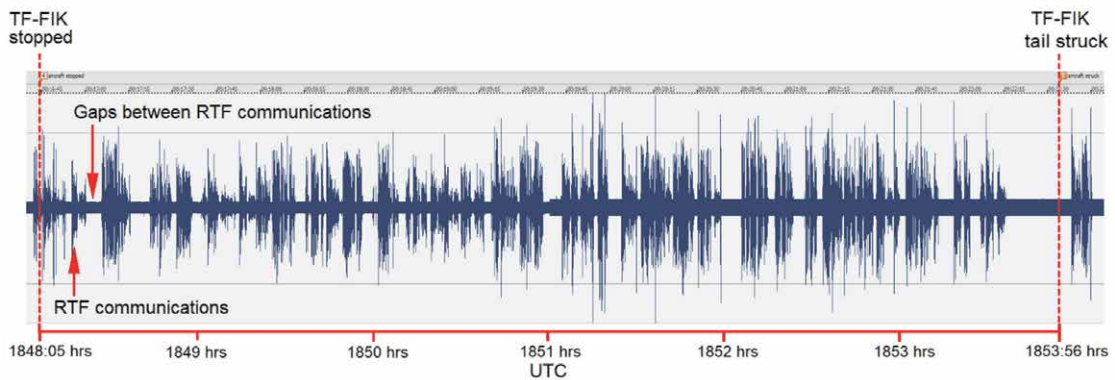


Figure 6

Analysis of the ground frequency whilst the B757 was stationary on Stand 241

Aerodrome information

Taxiway Lima is a 'code F' taxiway, suitable for a Boeing 777-300. Parking stands are delineated by a double white line. If parked aircraft are positioned within the white lines, an aircraft taxiing on the centreline will have sufficient wingtip clearance.

The UK AIP entry for Heathrow contains the guidance shown in Figure 7. The AIP entry is several pages long and describes many procedures for Heathrow, of which this is a small part. It describes the procedure flight crew should follow if the stand guidance is not active when approaching the stand or if it fails whilst parking. Holding position on the centreline has the advantage that the aircraft overtly blocks the taxiway, reducing the chance of a collision, and permitting the aircraft to continue to taxi if required and with permission.

Flight crew must not attempt to self-park if the VDGS is not activated or calibrated for their aircraft type.

In the event of there being no activated VDGS displayed upon approach to the stand flight crew should:

- *Hold position on the taxiway centre-line.*
- *Inform Ground Movement Control (GMC) they are awaiting stand entry guidance.*
- *Contact company to arrange activation.*

Note, GMC may request aircraft to 'report parked' – this is not an instruction to self-park.

In the event of a failure of the VDGS during parking, flight crew should

- *Inform Ground Movement Control (GMC) of a stand guidance failure.*
- *Contact company to arrange a marshaller.*

Figure 7

Text from the UK AIP entry for Heathrow Airport

Stand 241 cannot be seen from the ATC visual control tower as it is obscured by a hotel and the terminal buildings. The view from the ground controller's position in use at the time is shown in Figure 8. Figure 9 shows an image from the ATC ground movement radar as the B777 taxied past Stand 241. A small primary radar return can be seen at the back of the stand and is likely to be the B757 protruding from the stand. Primary radar returns are masked once the aircraft is on stand. An aircraft normally shows a secondary radar return until its transponder is switched off. Whilst taxiing, a label giving the aircraft's callsign (and parking stand for inbound aircraft) is displayed alongside the secondary return. These labels are suppressed when the aircraft is on stand. With the B757 not fully parked it would normally show as a hollow diamond until the transponder is switched off. However, as shown in Figure 9, no diamond was displayed for this aircraft. It was not determined why the diamond was not displayed. ATC reported that the controller would not normally

respond to the small primary returns as they are common across the airport. Similarly, even if the hollow diamond had been displayed, it is unlikely to have suggested anything abnormal to the controllers as these are often displayed on stands (as can be seen on several other stands in Figure 9).

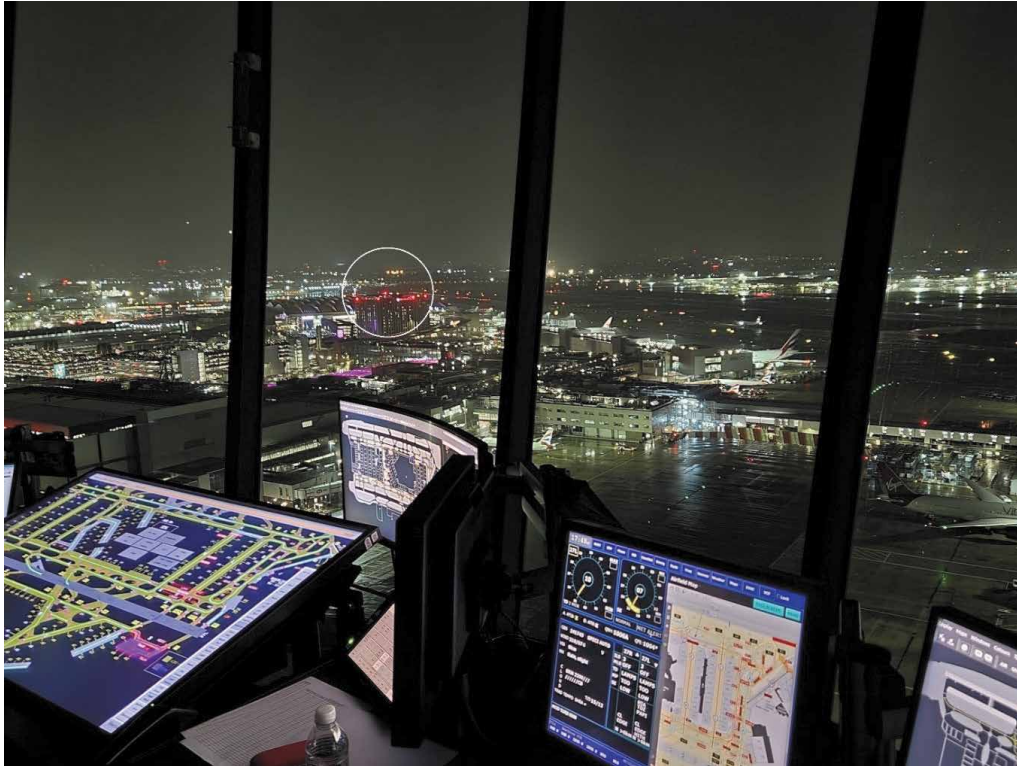


Figure 8

View from the ATC ground controller position (location of Stand 241 circled)

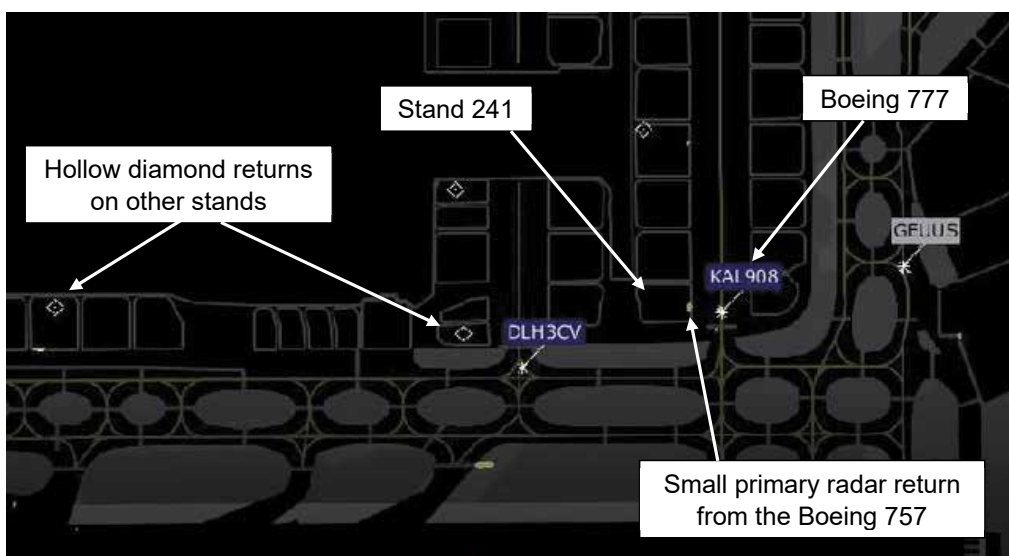


Figure 9

Extract for the ground movement radar as the B777 passed Stand 241

Flight crew

Flight crew experience and recency is shown below.

	Boeing 777-300		Boeing 757-256	
	Commander	Co-pilot	Commander	Co-pilot
Total time (hours)	10,561	3,478	15,500	2,907
Time on type (hours)	3,384	2,735	12,500	2,321
Last 90 days (hours)	248	176	116	194
Last 28 days (hours)	73	56	50	59
Start of duty	1835 hrs		1430 hrs	

Table 1

Flight crew hours and recency

The B777 crew reported that they were well rested and did not consider fatigue was a factor in the accident. They reported they departed stand on time and were not under any abnormal time pressure.

The commander of the B757 reported that he had read the AIP entry regarding stand guidance in the past. However, his normal practice was to initiate the turn onto the stand before looking to see if the guidance was activated rather than looking sideways for guidance whilst still on the centreline. He stated that, in his experience, the guidance was often switched on as the aircraft turns onto the stand and that starting the turn had never been a problem; nor had he heard of it being a problem for other pilots. He reported that he did consider informing ATC that they were not fully parked, but the ground frequency was too congested and it was not possible for them to make a radio call.

Previous incident

A similar event occurred six weeks before this event, on 16 August 2022. A Boeing 787-900 was parking on Stand 244 when the stand guidance system failed. The aircraft stopped short of the final position to await a marshaller. As the marshaller arrived and starting to marshal the aircraft, a Boeing 787-800 was taxiing south along Taxiway Lima. The right wingtip of the Boeing 787-800 collided with the tail of the Boeing 787-900. Initially no one realised a collision had occurred and the Boeing 787-800 took off without the flight crew knowing the aircraft was damaged. Figure 10 shows the damage to the Boeing 787-800, discovered after landing.

The Boeing 787-900 crew did not report to ATC that they were not fully parked. That incident was not investigated by the AAIB.

Following this event, the Heathrow Air Navigation Service Provider (ANSP) issued a Safety Alert to remind operators about the AIP entry regarding VDGS. The Safety Alert was highlighted at the Heathrow Flight Operations Safety Committee and in several other forums.

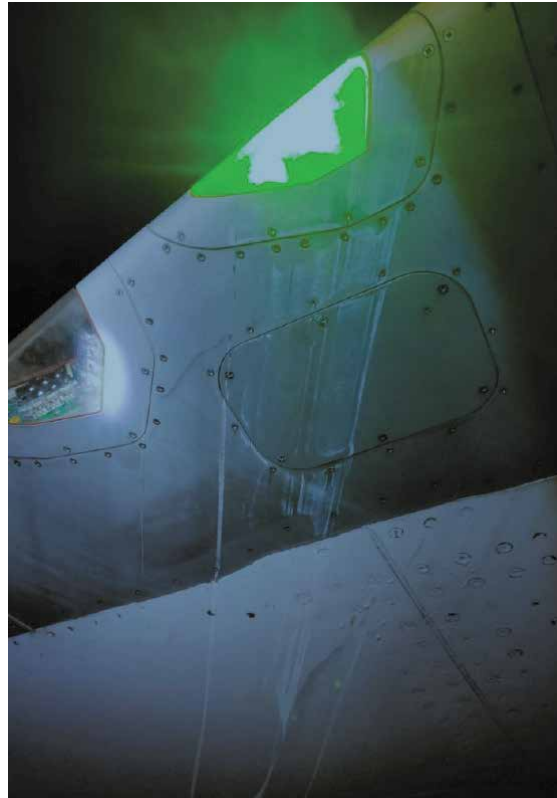


Figure 10

Damage to a Boeing 787-800 after a similar collision

The AAIB has investigated previous ground collisions at Heathrow. On 15 October 2007 a collision occurred between an Airbus A340 (4R-ADC) and a Boeing 747 (G-BNLL) and on 23 March 2004 a collision occurred between an Airbus A321 (EI-CPE) and a Boeing 747 (G-BNLK). Both events occurred near the runway holding points. The reports highlighted that pilots and tug drivers often perceive an ATC taxi clearance to imply the route is clear of obstructions. Controllers will alert crews if they know of a conflict but cannot do so if they don't. AAIB Safety Recommendations were made to enhance the guidance available to ensure pilots and tug drivers are aware that conflicts may exist whilst taxiing, and that pilots and tug drivers remain responsible for ensuring safe separation. The Safety Recommendations were accepted.

Organisational information

The sequence of events that led to this accident began with the VDGS not being switched on when the aircraft arrived at the stand. During the period between 1842 hrs and 1858 hrs reviewed as part of this investigation five other aircraft reported being unable to park because there was no stand guidance. However, as these were reported to ATC, in accordance with the AIP, no other incidents occurred. Heathrow ATC and the airport operator reported that lack of stand guidance is currently a persistent problem.

Analysis

The collision occurred when a Boeing 757 was waiting to park on stand and a Boeing 777 attempted to taxi behind it. The B777 pilots saw the B757 protruding from the stand but considered it was safe to continue taxiing because ATC had cleared them to do so, and because they had green taxiway lights ahead. They also reported that the anti-collision light on the B757 appeared to them to be off, suggesting it was fully parked. CCTV evidence showed the anti-collision light was on.

Heathrow ATC cannot see this parking stand from the visual control tower, and ground radar did not show the B757 once it had turned onto stand, so ATC had no way to know the aircraft was not fully parked. The AAIB has previously reported on ground collisions where pilots thought they had safe separation because they had an ATC clearance. ATC try to inform pilots if they become aware of a hazard, but they can only do this if they know about the hazard. Whilst it remains the pilot's responsibility to ensure sufficient wing tip clearance exists, it is not possible to see the wingtips of a B777-300 from the flight deck, as they are 32.4 m outbound and approximately 47 m behind the flight deck. Parking stands are delineated with a double white line, and if anything is protruding beyond these lines wing tip clearance cannot be assured. A significant proportion of the B757 was over the lines and protruding into the taxiway as illustrated in Figure 5.

When the B757 approached the parking stand the guidance system was not switched on. In these circumstances the LHR AIP entry instructs pilots to remain on the taxiway centreline and inform ATC. However, the B757 commander reported he normally initiated the turn before checking for guidance and was not aware that this could cause a problem. He reported that they did not inform the ATC ground controller due to congestion on the ground frequency but there was no discussion between the pilots on the CVR about contacting the ATC ground controller until after the collision and analysis of the ground frequency recordings suggested sufficient gaps existed to make a call. The rule to stop on the centreline and inform ATC is the primary barrier to prevent this type of accident. However, there are different rules and procedures in airports around the world and it can be challenging for pilots to read all the guidance and remember all the rules at each airport. The stand guidance rule at Heathrow is a few lines within many pages of text so is not especially prominent.

A similar incident occurred a few weeks before this accident but, in the previous incident, one of the aircraft took off without the pilots knowing their aircraft was damaged and continued its flight to its destination. It was luck that the damage was minor and a more serious accident did not occur. Following this incident, the ANSP issued a Safety Alert to remind the major operators at Heathrow about the AIP rule and this was highlighted in several airport operator forums. After this more recent accident an Aeronautical Information Circular and a NOTAM have been published highlighting the rule.

Lack of stand guidance when arriving on stand is reported to be a regular problem at Heathrow. On the day of this accident, it was reported that the problem was exacerbated by staff shortage caused by the closure of one of the tunnels used to access the central area. A lack of resources in one part of a system can have a safety consequence in another part

of the system, with the potential to contribute to an accident. In this case, pilots and ATCOs inherited a problem initially caused by ground staff shortages.

Conclusion

The collision occurred because the commander of the B777 continued to taxi past the protruding B757, believing it was fully parked and that the ATC clearance and green taxiway lights implied the route was clear. The commander of the B757 did not follow the Heathrow AIP instruction to remain on the centreline if no stand guidance is available, because his normal practice was to look for guidance after he had turned onto the stand.

The initiating event was a lack of stand guidance when the B757 arrived on stand, caused by ground staff shortages. Lack of stand guidance is a common occurrence at Heathrow that all parties should continue to work together to address.

Bulletin Correction

Prior to publication two amendments were made to the report.

On page 115 under the section 'Heathrow ground handling', the second sentence of the second paragraph 'It would only expect to provide a marshaller in the event of a failure of the guidance system.' was changed to:

'It would only expect to provide a marshaller in the event of a failure of the guidance system as specified in the UK AIP entry for Heathrow.'

On page 124 the final sentence of the conclusion 'This is a common problem at Heathrow.' was changed to:

'Lack of stand guidance is a common occurrence at Heathrow that all parties should continue to work together to address.'

The online version of the report was corrected before the report was published on 8 June 2023.