Air Accident Investigation Unit Ireland

SYNOPTIC REPORT

SERIOUS INCIDENT
Boeing 737-800, EI-EMM
Dublin Airport

11 December 2021

An Roinn Iompair
Department of Transport

Foreword

This safety investigation is exclusively of a technical nature and the Final Report reflects the determination of the AAIU regarding the circumstances of this occurrence and its probable causes.

In accordance with the provisions of Annex 13[1] to the Convention on International Civil Aviation, Regulation (EU) No 996/2010[2] and Statutory Instrument No. 460 of 2009[3], safety investigations are in no case concerned with apportioning blame or liability. They are independent of, separate from and without prejudice to any judicial or administrative proceedings to apportion blame or liability. The sole objective of this safety investigation and Final Report is the prevention of accidents and incidents.

Accordingly, it is inappropriate that AAIU Reports should be used to assign fault or blame or determine liability, since neither the safety investigation nor the reporting process has been undertaken for that purpose.

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[1] **Annex 13**: International Civil Aviation Organization (ICAO), Annex 13, Aircraft Accident and Incident Investigation.
[2] **Regulation (EU) No 996/2010** of the European Parliament and of the Council of 20 October 2010 on the investigation and prevention of accidents and incidents in civil aviation.
[3] **Statutory Instrument (SI) No. 460 of 2009**: Air Navigation (Notification and Investigation of Accidents, Serious Incidents and Incidents) Regulations 2009.

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In accordance with Annex 13 to the Convention on International Civil Aviation, Regulation (EU) No 996/2010 and the provisions of SI No. 460 of 2009, the Chief Inspector of Air Accidents, on 11 December 2021, appointed Kate Fitzgerald as the Investigator-in-Charge to carry out an Investigation into this Serious Incident and prepare a Report.

Aircraft Type and Registration:	Boeing 737-800, EI-EMM	
No. and Type of Engines:	2 X CFM56-7B	
Aircraft Serial Number:	38514	
Year of Manufacture:	2010	
Date and Time (UTC)[4]:	11 December 2021 @ 22:54 hrs	
Location:	Dublin Airport (EIDW), Ireland	
Type of Operation:	Commercial Air Transport	
Persons on Board:	Crew – 6	Passengers – 139
Injuries:	Crew – Nil	Passengers – 2
Nature of Damage:	Nil	
Commander's Licence:	European Union Airline Transport Pilot Licence (ATPL) Aeroplane (A), issued by the Irish Aviation Authority (IAA)	
Commander's Age:	60 years	
Commander's Flying Experience:	25,049 hours, of which 16,445 were on type	
Notification Source:	Dublin Airport Duty Manager	
Information Source:	Desk Investigation	

[4] **UTC**: Co-ordinated Universal Time. All times in this report are quoted in UTC unless otherwise stated; local time was the same as UTC on the date of the accident.

SYNOPSIS

Whilst disembarking the aircraft at Dublin Airport, following a scheduled flight from Arrecife Lanzarote Airport, a Passenger fell while descending the forward aircraft stairs (airstair). The Passenger fell from close to the top of the airstair, collided with another disembarking Passenger who tried to arrest the fall, and landed on the ground at the bottom of the airstair. The Passenger who had fallen sustained serious injuries. The other Passenger reportedly sustained minor injuries.

NOTIFICATION AND RESPONSE

The AAIU Inspector-On-Call was notified by the Dublin Airport Duty Manager immediately following the occurrence and an AAIU investigation was commenced.

1. FACTUAL INFORMATION

1.1 History of the Occurrence

The Boeing 737-800 aircraft arrived on schedule following a flight from Arrecife Lanzarote Airport (GCRR) to Dublin Airport (EIDW) and was parked on stand 207T. During disembarkation, one of the Passengers, whilst descending from the forward airstair fell from close to the top of the stairs. The Passenger fell to the bottom of the airstair and collided with another Passenger, who was standing nearby on the airport apron, and who tried to arrest the fall. The Passenger who fell from the airstair sustained a serious head injury and was taken to hospital. The other Passenger reportedly sustained minor injuries. The airstair and surrounding area were inspected by the Airport Fire and Rescue Services and by the Operator's personnel. No defects were found, and disembarkation was resumed.

1.2 Injuries to Persons

According to reports from the Airport Authority and the Aircraft Operator, one Passenger sustained serious injuries and one Passenger sustained minor injuries (**Table No. 1**).

Injuries	Crew	Passengers	Others
Fatal	0	0	0
Serious	0	1	0
Minor	0	1	0

Table No. 1: Injuries to Persons

1.3 Damage to Aircraft

There was no damage to the aircraft.

1.4 Aircraft Information

1.4.1 General

The aircraft was a Boeing 737-800, powered by two CFM56-7B engines. It was manufactured in 2010 and had a Certificate of Airworthiness which was issued by the IAA on 20 May 2010. The most recent Airworthiness Review Certificate was issued on 19 April 2021 and was valid until 19 May 2022.

1.4.1 Aircraft Forward Stairs

The Boeing 737-800 aircraft type has an integrated, retractable stairs known as an airstair installed at the front left exit (**Figure No. 1**), which was in use by the Operator for embarkation and disembarkation. The airstair is approximately 0.62 m wide and as such is narrower than the mobile stairs provided by ground handling agents at airports.

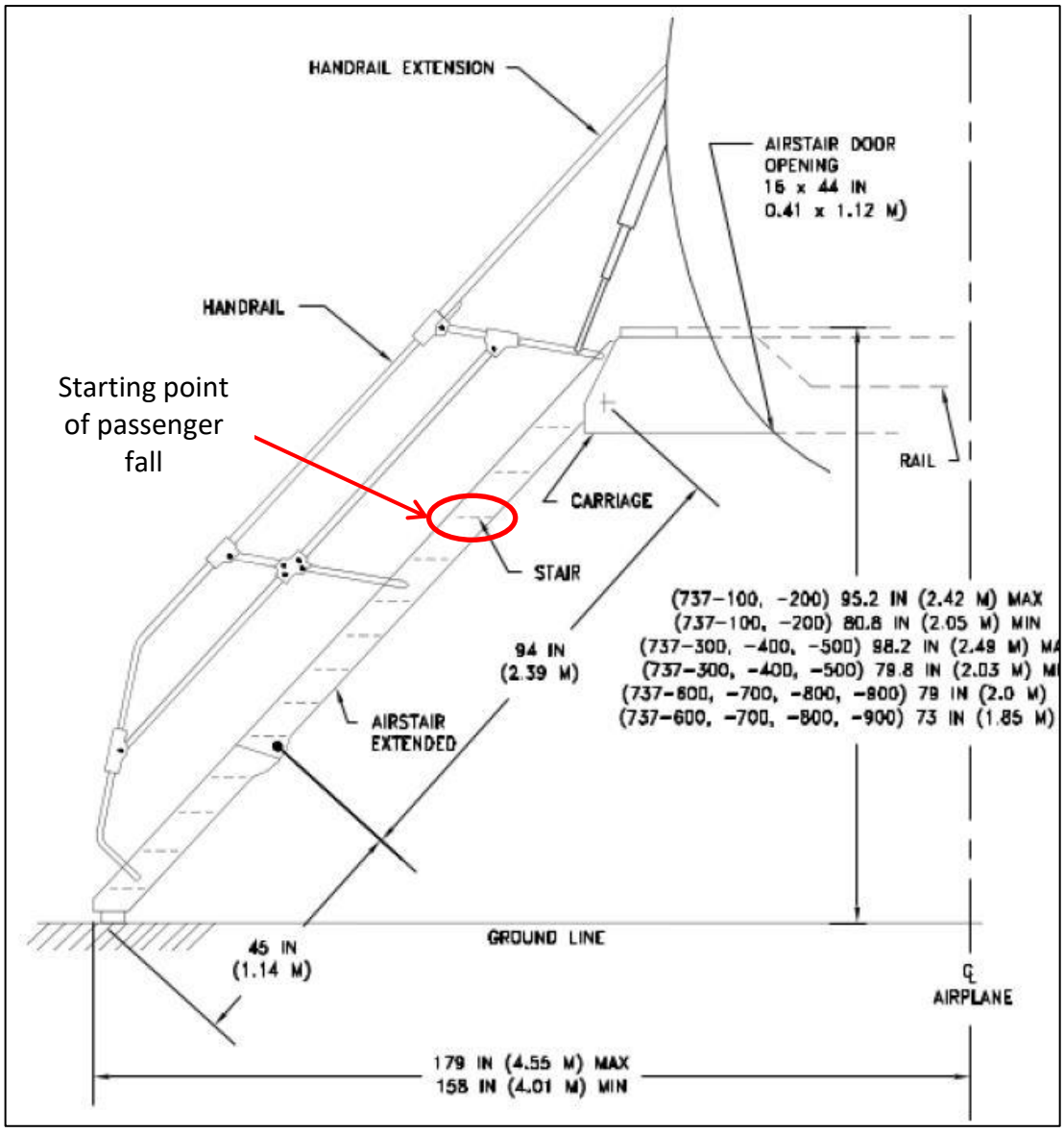

Figure No. 1: Aircraft Manufacturer's drawing of airstair looking forward (starting point of Passenger fall indicated by Investigation)

A number of Aircraft Manufacturer-approved safety measures had been installed on the occurrence aircraft by the Operator. These included:

- Non-slip material covering the stair treads.
- High visibility, retractable safety barriers.
- Detachable airstair rails to provide a visual connection between the aircraft and the integrated handrails.
- Signs warning passengers travelling with small children to hold their hands when on the stairs.

1.4.2 Certification Specifications

There are no European Union Aviation Safety Agency (EASA) CS-25[5] Certification Specifications to guide the design of integrated stairs because integrated stairs are not deemed critical to the operation of the aircraft.

1.5 CCTV Recording

The Investigation was provided with CCTV footage from the airport operator, which showed the Passenger falling from the airstair. The Passenger was holding on to the handrails on either side of the airstair with each hand, while at the same time carrying an item of clothing in their right hand.

The CCTV footage showed that the Passenger stepped onto the top step with their left foot and then placed their right foot beside their left foot on the top step. They repeated this process when moving down to the second step. The Passenger then placed their left foot on to the third step and appeared to fall forwards as they tried to place their right foot onto the fourth step. The Passenger did not appear to stumble prior to falling. The Passenger's clothing did not appear to have caught on the handrails or any other part of the airstair. A second Passenger who was waiting on the ground close to the bottom of the airstair attempted to arrest the first Passenger's fall.

There did not appear to be any significant adverse weather (rain or high wind) at the time of the occurrence, although the ground around the aircraft appeared wet. The area around the aircraft was well lit. Ground staff close to the aircraft, and cabin crew, provided immediate assistance. An ambulance arrived at the scene approximately seven minutes after the occurrence.

1.6 Cabin Crew Statements

The Cabin Crew Members later reported that the Passenger was holding on to the handrail at the time of the occurrence and was carrying an item in their hand. The airstair was reported to be dry at the time of the occurrence. The Cabin Crew also reported that the Passenger sustained a head injury in the fall and that they tried to keep the Passenger warm and still until the ambulance arrived.

[5] **CS-25:** EASA CS-25 contains certification specifications for large aeroplanes.

1.7 Passenger Statement

The Investigation was provided with contact details for the Passenger. However, when the Investigation attempted to make contact using these details, no response was received. The Investigation asked the Operator to inform the Passenger that the Investigation would like to speak with them, but the Operator informed the Investigation that it had been unable to contact the Passenger.

1.8 Operator's Procedure

The disembarkation procedure used by the Operator requires the cabin crew to make the following announcement in English:

> *'Ladies and Gentlemen, you may now disembark the aircraft using both the forward and rear doors. All passengers should use the handrail provided when walking down the stairs. For passengers travelling with children, please hold their hands as you walk down the stairs and until you are inside the terminal building. Walk around the wing and not under the wing. Thank you and good morning/afternoon/evening'.*

The Investigation was informed that this announcement was made prior to disembarkation.

1.9 Meteorological Information

Met Éireann, the Irish meteorological service, was asked to provide details of the weather conditions prevailing at EIDW at 22:54 on 11 December 2021. Pertinent details from the report received are reproduced in **Table No. 1**.

Surface Wind:	South-west 5-9 knots (kt)
Visibility:	20 kilometres (km)
Weather:	Cloudy with light rain
Surface Temperature/Dew Point:	11/9 degrees Celsius

Table No. 1: Weather conditions at EIDW at the time of the occurrence

1.10 Previous Occurrences

Integrated airstairs are a component of the aircraft and are therefore subject to investigation by National Aviation Safety Investigation Authorities. However, accidents and serious incidents involving mobile stairs used at most airports are not generally investigated by National Aviation Safety Investigation Authorities because they are not part of the aircraft.

There have been a number of previous occurrences involving passenger falls from the airstair of this aircraft type which have been the subject of investigations by National Safety Investigation Authorities. In 2007, the Federal Aviation Administration (FAA) published Special Airworthiness Information Bulletin (SAIB): NM-07-47. This bulletin was issued in response to four occurrences where children fell from the airstair. The SAIB recommended that operators:

'[…] *incorporate Boeing Service Bulletin 737-52-1157, as well as Monogram Systems Service Bulletin 870700-52-2130, which is referred to in the Boeing service bulletin. These service bulletins add warning placards to the risers on the airstair steps and door jams, as well as anti-skid material to the side beams and top stair of the airstairs. The warning placards advise to hold a child's hand while they are on the airstairs. Boeing has also revised the flight attendant manual, as applicable, advising to pay particular attention to persons with small children or those with special needs.'*

The airstair installed on the occurrence aircraft had incorporated the recommendations of the SAIB.

In January 2022, CIAIAC[6], the National Safety Investigation Authority of Spain published a final report relating to a passenger fall from the forward integrated stairs of another of the Operator's aircraft. Two Safety Recommendations were made to the Operator. These were:

'REC 01/22: It is recommended that [Operator name] *modify its disembarkation procedure to provide the warning concerning the use of the handrail when descending the stairs in the official languages of the departure and destination countries as well as English.*

REC 02/22: It is recommended that [Operator name] *reinforce its disembarkation procedure to stipulate that if a member of the cabin crew observes a passenger intending to descend the forward airstairs without a free hand, they should remind them that they must use the handrail when descending the stairs.'*

The Operator informed the Investigation that it had accepted both recommendations and was in the process of implementing them.

1.11 EASA Study

In 2009, EASA commissioned a study of CS-25 Cabin Safety Requirements. One of the recommendations from the study was:

'Recommendation 48 – Recommendation for incorporating industry standards for general occupant safety (e.g. slip, trip and fall prevention) into AMC **[Acceptable Means of Compliance]**

Whilst many of the slip, trip, and fall accidents inside or from the cabin involved non-compliance with standard operating procedures or complacency, there may be aircraft design features that can reduce its risk. This may be particularly relevant to features like staircases within very large twin-deck aircraft such as the A380. Additionally, there are no regulations governing the height, angle or slip resistance of the steps, or the provision of handrails for integrated airstairs. Industry standards (SAE publications) on these subjects are available. It is recommended that further deliberation be given by EASA to investigate the feasibility of the incorporation of (or referral to) such standards into airworthiness requirements.'

EASA informed the Investigation that all the recommendations made in the Cabin Safety Requirements Study were analysed and categorised. Recommendation 48 was categorised in

[6] CIAIAC: Comisión de Investigación de Accidentes e Incidentes de Aviación Civil.

the '*Other Recommendations*' category. This category contained recommendations for improvements that were not necessarily related to amendments to CS-25 requirements or further research. These include recommendations to review CS-ETSO[7], incorporate industry standards, and provide additional guidance material to CS-25.

EASA also informed the Investigation that they will continue to monitor the statistics related to integrated airstairs events in the frame of the EASA SRM (Safety Risk Management) process. EASA is also assessing all airstairs that are included in new projects (Initial Certification approval) and are considering whether additional regulation is required.

2. ANALYSIS

On an annual basis the number of reported occurrences on integrated aircraft stairs is relatively small, as are the reports involving other passenger injuries. However, the time that an individual passenger spends on aircraft stairs is also very small compared to the amount of time the passenger spends on the aircraft for the rest of their flight. Consequently, on a pro-rata basis, the time a passenger spends on the aircraft stairs is a time of higher risk of injury, than the remainder of their flight.

Aviation Safety Management Systems (SMS) may capture details of stair falls and these will usually be reported by flight crew or ground staff at an airport. However, minor slips and trips which do not cause serious injury may not be reported by passengers and therefore would not be captured in an SMS. A consequence of such non-reporting is that the aviation industry has limited safety data available to assess the full extent of the risk posed to passengers by aircraft stairs.

Many large passenger aircraft do not have integrated stairs, and as they are not critical to the operation of the aircraft, there are no Certification Specifications to guide the design of such integrated stairs. Mobile stairs provided by handling agents at airports are required to meet minimum design standards including stair width and side barriers of a minimum height. However, mobile stairs are not subject to investigation by National Aviation Safety Investigation Authorities because they are not a component of the aircraft. Therefore, investigation data relating to accidents or serious incidents on mobile stairs, which could allow a comparison to integrated airstairs to be carried out, is not readily available.

Continued vigilance, and proactive engagement with passengers, is required by air operators to ensure that passengers are advised and supported in minimising their risk whilst using airstairs. The Investigation notes the actions that have been taken over several years to reduce the risk of passenger injuries on airstairs by the FAA, the Aircraft Manufacturer and the Operator. The Investigation also notes the Operator's acceptance of, and intention to implement, the Safety Recommendations of CIAIAC as outlined in CIAIAC Final Report A020-2021. In addition, the Investigation welcomes the on-going work that is being undertaken by EASA to monitor the frequency of this type of occurrence and to assess airstairs that are included in new, initial certification projects.

[7] CS-ETSO: Certification Specification – European Technical Standard Orders.

In this occurrence CCTV footage showed that the Passenger did not appear to be rushing, was holding on to both handrails, and was carrying a single item in one hand at the time of the occurrence. However, previous similar occurrences have demonstrated that rushing, use of hand-held devices, alcohol consumption and carrying multiple items of luggage are risk factors that may increase the probability of a passenger falling on aircraft stairs. As many of these activities are synonymous with modern air travel, the Investigation considers that promoting behaviours that minimise a passenger's individual risk could help to reduce the number of this type of occurrence. Accordingly, the Investigation makes the following Safety Recommendation to EASA:

> **Safety Recommendation No. 1**
>
> EASA undertakes a safety promotion campaign to highlight to passengers and crew, the behaviours which will minimise their personal risk of falling whilst embarking or disembarking an aircraft.
> (**IRLD2023001**).

In this case, the Investigation was unable to speak to the Passenger, as no response was received when the Investigation tried to make contact. Therefore, it was not possible to conclusively determine the cause of the fall.

3. CONCLUSIONS

3.1 Findings

1. The annual aircraft Airworthiness Review Certificate was issued on 19 April 2021.
2. The aircraft landed at Dublin Airport (EIDW) following a flight from Arrecife Lanzarote Airport (GCRR).
3. During passenger disembarkation a Passenger fell from close to the top of the forward airstairs and collided with another Passenger standing on the apron at the bottom of the airstair.
4. The Passenger who fell sustained a serious head injury, the other Passenger reportedly sustained minor injuries.
5. The airstairs were subsequently inspected and no defects were found.
6. There was no adverse weather at the time of the occurrence.

3.2 Probable Cause

Passenger fell from forward airstairs whilst disembarking aircraft.

4. SAFETY RECOMMENDATIONS

No.	It is Recommended that:	Recommendation Ref.
1.	EASA undertakes a safety promotion campaign to highlight to passengers and crew, the behaviours which will minimise their personal risk of falling whilst embarking or disembarking an aircraft.	IRLD2023001

View Safety Recommendations for Report 2023-010

- END -

In accordance with Annex 13 to the Convention on International Civil Aviation, Regulation (EU) No. 996/2010, and Statutory Instrument No. 460 of 2009, Air Navigation (Notification and Investigation of Accidents, Serious Incidents and Incidents) Regulation, 2009, the sole purpose of this investigation is to prevent aviation accidents and serious incidents. It is not the purpose of any such investigation and the associated investigation report to apportion blame or liability.

A safety recommendation shall in no case create a presumption of blame or liability for an occurrence.

Produced by the Air Accident Investigation Unit

AAIU Reports are available on the Unit website at www.aaiu.ie

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