

Passengers trapped in doors and dragged in north London, 23, 27 and 29 June 2022

Important safety messages

These incidents demonstrate the importance of:

- ensuring that drivers are properly supported in the task of train dispatch through suitable training, briefings and maintenance of equipment
- drivers relying on their final safety check rather than the door interlock when making a decision to dispatch a train, because of the limitations of such systems in detecting small objects trapped in the doors
- train operating companies continuing to raise passengers' awareness of the particular hazards that train doors can present when closing.

Summary of the incidents

At around 09:11 hrs on 23 June 2022, a passenger's hand became trapped in the closing doors of a train departing from Seven Sisters station. The passenger, along with two other people, had rushed towards the train while the doors were closing, and placed their hand between the doors.

The train departed with the passenger's hand still trapped, and they ran alongside the train for about nine metres before freeing their hand from the doors. The train reached a maximum speed of 8 mph (13 km/h) before the driver applied the brakes, and the train stopped after travelling for a total distance of about 36 metres.

Four days later, at around 06:26 hrs on 27 June 2022, a passenger rushed towards the closing doors of a train departing from Wembley Central station and placed an object (believed to be a walking stick or pole) between the doors. This object became trapped in the doors. The train then departed and travelled about five metres, reaching a maximum speed of 3 mph (5 km/h) before coming to a stand. During this time, the passenger stayed in contact with the object while moving along the platform to keep pace with the train. The object remained trapped until the driver reopened the doors, shortly after stopping.

At around 13:46 hrs on 29 June 2022, a passenger rushed towards the closing doors of a train about to depart Crouch Hill station. The passenger placed their umbrella between the closing doors of the train, which then departed with it trapped in the doors. The train travelled for around 11 metres and reached a maximum speed of 6 mph (10 km/h) before stopping. The passenger briefly held on to the umbrella as the train started to move, but then let go of it before the train stopped. After stopping, the driver walked through the train to manually open the set of doors involved, which released the umbrella.

None of the passengers involved were later identified, but there is no indication that any of them were injured during these incidents.

All the trains involved were Bombardier class 710 units operated by Arriva Rail London under the London Overground concession agreement with Transport for London. These units were introduced into service in May 2019.

The train at Seven Sisters was formed of eight coaches, while the trains at Wembley Central and Crouch Hill were formed of four coaches. The drivers were all experienced, having driven trains for Arriva Rail London (and its predecessors) for between 10 and 23 years.



The train at Seven Sisters station on 23 June 2022 (image courtesy of Arriva Rail London).

Cause of the incidents

These incidents occurred because the drivers of these trains did not realise that a passenger was in a potentially unsafe position when making the decision that it was safe to start.

The dispatch of the class 710 trains involved in these incidents is carried out by the train driver and is known as driver only operation (DOO). This means that it is part of the driver's duties to operate the doors and check that the train is safe to depart. This check includes ensuring that no person or object is trapped in the closed doors or is in contact with the train, after the doors are closed. Arriva Rail London's train dispatch processes include instructions for drivers to check that the white line at the platform edge is unbroken when observing the in-cab monitors to ensure that no passenger or object is protruding from the platform edge towards the train. As the final safety barrier in the dispatch process, this task is vulnerable to variabilities in human performance.

To facilitate this check, bodyside cameras on each coach of the train are used to allow the driver to monitor the threshold between the platform edge and the train during station stops and for a short period after the train restarts, while it is travelling below 3.7 mph (6 km/h). Drivers view images from these cameras on two 264 mm monitor screens in the driving cab, each capable of displaying up to six images, depending on the length of the train. There is one image for each coach, plus an additional image covering a blind spot at the front of the train (that is, five images for a four-coach train, nine images for an eight-coach train).



Interior of the class 710 driving cab with the DOO monitor screens highlighted (image courtesy of Arriva Rail London).

It is not possible for the driver of a class 710 train to apply traction power if the door interlock, an electrical circuit which confirms that all doors are fully closed and locked, has not been obtained (in other words, the circuit is complete). The driver will receive an indication that the interlock has been obtained via an indicator light in the driving cab. The passenger doors on the class 710 also have an obstacle detection system which is designed to detect the presence of an obstruction when the doors are closing or closed. Objects are detected by monitoring the door motor current and by door position sensors. The doors will automatically reopen if objects which are at least 30 mm thick are detected. Objects which are thinner than 30 mm, such as fingers or walking sticks, or which are non-rigid in nature, such as bag straps, will not necessarily be detected by this system and may still become trapped in closed and locked doors.

Because of such limitations on interlock systems, the applicable rail industry standard (RIS-2703-RST, issue 2, December 2018) explains the importance of using the cameras and monitors to carry out a 'train safety check' after the doors are closed and interlock is achieved. The Rule Book also instructs drivers not to rely on the interlock as an indication that it is safe to depart.

The driver of the train at Seven Sisters was unaware that the passenger was trapped in the doors when he initially departed from the station. He subsequently stopped the train when he became concerned about the situation being shown on the monitors. After the incidents, Arriva Rail London checked the alignment of the cameras of the trains involved. It discovered that the relevant camera on the Seven Sisters train was misaligned and that this meant that the trapped passenger was visible on the monitor only from the neck down.

The train drivers involved in the other incidents at Wembley Central and Crouch Hill were aware of the passengers in close proximity to their trains when they decided it was safe to start, but not that objects had become trapped in the doors. The drivers stopped their trains immediately when it became clear that the objects and the passengers involved were moving with the train.

There are two sets of doors on each coach of the class 710 units, and each bodyside camera covers both these sets of doors. Before the introduction of these units, the manufacturer of the trains demonstrated that the camera images were compliant with the relevant rail industry standard (RIS-2703-RST) for ensuring that objects were sufficiently conspicuous when displayed on the monitor. However, in all three incidents, the passengers were standing at the rearmost door, furthest away from the perspective of the relevant camera. A passenger at the rearmost door would inevitably be less conspicuous on the monitors than one standing closer to the camera, due to their relative image size.

Witness evidence indicated that the quality of the image displayed on the monitors might not always be adequate for drivers to detect the presence of small objects such as those involved in these incidents. Witnesses also stated that some of the white lines on platform edges need repainting, potentially affecting the ability of drivers to detect whether the white line is being broken by a protruding object during train dispatch.

Arriva Rail London told RAIB that it held a safety training day in 2018, which included specific messaging that drivers should not rely on the interlock alone to confirm that it is safe to depart. More recently, following a similar incident in

January 2022 (see [RAIB safety digest 01/2022](#)), Arriva Rail London posted a briefing note at all driver depots, again reminding drivers of the risk of relying only on the interlock. Witness evidence was that there was no face-to-face presentation of this briefing note. The driver involved in the incident at Crouch Hill stated that they did not know about the limitations regarding door interlocks at all and that they relied on the door interlock indicator as assurance that nothing was trapped in the doors.

In each of the incidents described above, the time interval between achieving door interlock and the train departing was between 2.4 and 2.9 seconds. Such times are comparable with those found in other RAIB investigations (such as [RAIB report 03/2019](#)). During this time, drivers are expected to scan the DOO monitors and perform their final safety check. Witness evidence indicated that some drivers perceived a need to keep this check as short as possible, as prolonging it could lead to an accumulated delay over the course of a journey.

Research report T1102 published by the Rail Safety and Standards Board (RSSB, a rail industry body which provides support for a wide range of cross-industry activities) found that the majority of passengers did not understand the meaning of the door close alarm, with most believing that train doors would reopen if they were obstructed, in the same way as lift doors.

Previous similar occurrences

RAIB has published numerous reports and safety digests about similar trap and drag incidents across mainline and metro railways. Of particular relevance to the incidents discussed in this digest was an incident at Wood Street station involving an Arriva Rail London class 710 train, which occurred on 14 January 2022 ([RAIB safety digest 01/2022](#)). In common with the incidents at Wembley Central and Crouch Hill described above, the driver at Wood Street had noticed the passenger in close proximity to the train but was not aware that they were trapped in the doors. The safety digest highlighted the importance of carrying out a thorough final safety check and not relying on the interlock system as proof that it is safe to move a train.

RAIB also investigated an accident at Elstree & Borehamwood station on 7 September 2018 ([RAIB report 03/2019](#)). In that case, a dog died after its lead became trapped in the closed doors of the departing train and it was dragged off the platform. The report made two recommendations. The first of these was to improve guidance and monitoring for drivers regarding observations of the platform-train interface during train dispatch. The second recommendation was for the industry to research technological solutions to enhance the detection of passengers or objects trapped in train doors, reducing the reliance on human performance of this task.

A wider summary of previous RAIB learning about managing the risk at the platform-train interface can be found on RAIB's [website](#).