

Passenger trapped in doors and dragged at Enfield Town station, 17 July 2024

Important safety messages

This accident demonstrates the importance of:

- staff responsible for dispatching trains carrying out an effective final safety check
- those responsible for train specification, and train operating companies, being aware of the natural limitations of human performance and implementing appropriate technological solutions and engineered safeguards to mitigate the risks associated with the dispatch of trains
- train operating companies continuing to raise passenger awareness about the hazards associated with obstructing closing train doors.

Summary of the accident

At around 18:07, a passenger's hand became trapped in the doors of a train about to depart from Enfield Town station in North London. Platform CCTV shows that the passenger had hurried towards the train as the doors were closing and placed their hand between the doors while attempting to board.

The train subsequently departed from the platform with the passenger's hand still trapped in the doors. The passenger was forced to run alongside the train, until eventually losing their footing while being dragged along the platform by the accelerating train.

Passengers on the train alerted the driver by operating emergency door release handles. The driver then stopped the train and released the doors, allowing the passenger to free their hand. During the accident, the train travelled approximately 60 metres and reached a speed of 11 mph (18 km/h). The passenger was taken to hospital, having sustained minor injuries and as a result of the accident also suffered psychological distress.

The train involved in the accident, reporting number 2U67, was the 18:07 Arriva Rail London (ARL) service from Enfield Town station to London Liverpool Street station. It was formed of 2 class 710 Avenra electric multiple units, each of 4 cars. The driver had worked for ARL since 2018.

Cause of the accident

The accident happened because the driver did not see that the passenger was close to the train and trapped in the doors when deciding it was safe to start the train.

The passenger is a regular user of Enfield Town station and was attempting to board the train that was leaving from platform 1. On-train data recorder evidence and CCTV images from the station and train 2U67 show that the passenger arrived on the platform at 18:06:54, less than 1 second after the driver had commanded the doors to close. CCTV evidence shows that the passenger placed their hand in the closing doors while attempting to board the train and was unable to free themselves from the closed doors once their hand was trapped.

The train began to move from the platform at 18:07:05. The dispatch of trains from Enfield Town station, including the train involved in the accident, is carried out by the train driver using driver only operation (DOO, sometimes referred to as driver-controlled operation). This means that it is part of the driver's duties to operate the doors and check that it is safe to close them and it is safe for the train to depart from the platform.

Railway Industry Standard RIS-2703-RST, 'Driver Controlled Operation (DCO) On-Train Camera/Monitors (OTCM)', issue 2 dated December 2018, states that it is important that drivers are assisted in the dispatch of the train by using cameras and monitors, as it is necessary to check that it is safe to depart after the doors are closed and interlock is achieved.

On class 710 trains, bodyside cameras are mounted on each coach. These allow the driver to view the platform-train interface on 2 in-cab monitors while the train is in the platform and when it starts. When the train reaches 6 km/h (3.7 mph) the images on the monitor screens extinguish. The number of images displayed on the primary and secondary monitors will depend on the length of the train. For an 8-coach train such as train 2U67, 9 images are displayed (1 image for each coach and 1 covering a blind spot at the front of the train). Each image measures 7 cm x 8 cm.

An indication that all the train's doors have been closed and locked is given to the driver through the door interlock system. The driver receives confirmation of this via an indicator light in the driving cab. It is not possible for the driver to apply traction power if door interlock has not been made.

The passenger doors on class 710 trains 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 reopen if an object at least 30 mm thick is detected. The doors and interlock system of the train involved were tested after the accident and were found to be operating correctly.

Objects which are thinner than 30 mm, such as fingers, walking sticks or objects that are not rigid in nature (such as coats) will not necessarily be detected by the system and so may become trapped in the closed door. In these circumstances, the driver will receive an indication from the interlock system that the doors are closed and locked, and so will be able to take traction power.

Train drivers at ARL are trained to follow the principles of the train dispatch rules contained in Rule Book Module SS1 GERT8000-SS1, 'Station duties and train dispatch', issue 9 dated December 2023, as supplemented by additional ARL rules contained in procedure SQE 20.6 'Train dispatch DOO procedures', issue 1 dated 2017. These rules state that drivers preparing to depart a platform using DOO must:

- check the platform signal, check the CCTV monitors to ensure they are working, and then observe the platform-train interface
- ensure there are no passengers attempting to board or alight before closing the doors
- observe the monitors while the doors are closing
- check the monitors again after they have obtained interlock to ensure that no person or object is in contact with the train, including a person's clothing or an item being held
- observe the platform-train interface and check that there is a continuous white line on the platform
- finally check for anything unusual on the platform, before starting the train.

The last three parts of this process are termed the 'train safety check'.

Drivers at ARL are trained to understand the limitations of the interlock. The driver in this accident was aware that an illuminated interlock light indicated that the doors were closed and locked, but that this did not necessarily mean it was safe for the train to depart. The train safety check is intended to control the safety risk arising from the limitations of the door obstacle detection system.

The in-cab CCTV images from train 2U67 were recorded and show what the driver could see before the passenger arrived on the platform. These recordings show that, before the train started, the passenger was located by the rearmost door and was visible in the top right image of the left monitor.



A class 710 driving cab with images from the monitors on the day of the accident superimposed by RAIB showing the passenger on the platform (courtesy of Arriva Rail London).

The driver of train 2U67 stated that they had checked the monitors before beginning to close the doors. A comparison of the in-cab CCTV images from the station and OTDR data shows that the check happened before the passenger was visible on the platform. OTDR data shows that the driver of train 2U67 received an indication that interlock had been gained and began to take power approximately 4 seconds later.

The train safety check that should be undertaken by the driver after the doors were closed did not detect that the passenger was standing close to the train or was trapped in the doors. The driver stated that they believed they had looked at the monitors after the doors had closed. As the passenger was at the rearmost door of the vehicle they were attempting to board, they would have been less conspicuous in the relevant monitor image since their relative size would have been small compared to a passenger standing closer to the camera. In addition, the driver may have developed a belief that it was safe to depart based on the images shown on the monitors at the point where they closed the doors. At that time, the in-cab CCTV recording shows that nobody was near to the train and the passenger involved in the accident had not yet reached the platform.

There have been a number of previous incidents on Aventra class 710 trains where passengers have had their hands trapped in the doors. Research report T1102, published by the Rail Safety and Standards Board, found that the majority of passengers did not understand the meaning of the door close alarm and most believed that the train doors would reopen if they were obstructed, in the same way as lift doors.

Class 710 trains, including train 2U67, have ‘sharks teeth’ markings on the door edges and warning labels intended to warn passengers of the potential danger of placing an object between closing doors. Some doors on class 710 trains, including those used by the passenger in this accident, have also been fitted with larger warning labels. ARL and other train operators have run passenger education campaigns to warn of the dangers of obstructing train doors and the Rail Safety and Standards Board facilitates a cross-industry group that aims to reduce passenger risk, including that associated with boarding and alighting trains.



Doors on the side of a class 710 showing the ‘sharks teeth’ markings and warning labels (courtesy of Arriva Rail London).

Evidence from this accident, and other incidents involving class 710 trains, also suggests that the door seals on this class of train (which meet at the edge of each door as they close and seal the doorway) may make it difficult for passengers to pull themselves free once their hand becomes trapped.

The class 710 train involved in this accident was not fitted with door technology such as sensitive door edges, which uses a detection system in the door seals which may detect smaller obstructions. They were also not fitted with anti-drag systems which use a special type of door seal and a monitoring system which can detect that a passenger has been trapped in the doors and is being dragged. Although these are being used by some train operators, including those operating other classes of Aventura trains, the class 710 trains were not specified to include such systems when brought into service in May 2019.

Previous similar occurrences

Several trap and drag accidents and incidents have been investigated by RAIB on both mainline railways and tramways.

RAIB investigated a trap and drag accident at Hayes & Harlington on 25 July 2015 ([RAIB report 12/2016](#)) where a passenger was dragged by a train when the driver did not identify that the passenger's hand was trapped in the closed and locked doors. Two recommendations were made, one of these to the train operator to review the fitting of sensitive edge door technology and another to understand passenger behaviour when boarding and alighting from trains and to identify the best methods and technology to promote safe behaviour.

RAIB investigated an accident at Elstree and Borehamwood station on 7 September 2018 ([RAIB report 03/2019](#)) when a dog's lead became trapped in the closing doors of a departing train. The report included a recommendation 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 alone.

RAIB also published a safety digest concerning an incident where a passenger's hand was trapped in the closing doors of a train at Wood Street station. This occurred on 14 January 2022 ([RAIB safety digest 01/2022](#)) and involved an ARL class 710 train. In this incident, the driver noticed that a passenger was close to the train but did not believe they were trapped because door interlock had been obtained. The safety digest highlighted the importance of a final safety check.

Of particular relevance to the accident at Enfield Town are 3 incidents that occurred on 23, 27 and 29 June 2022, all involving ARL class 710 trains ([RAIB safety digest 05/2022](#)). In the first of the incidents, a passenger's hand was trapped in the closing doors of a train departing Seven Sisters station. The passenger was dragged along the platform for 36 metres before the train stopped. In the second incident, a passenger placed a stick or pole in the closing doors at Wembley Central station. The passenger stayed in contact with the object and travelled approximately 5 metres until the train stopped and the driver opened the doors. In the third incident, at Crouch Hill station, a passenger placed their umbrella in the closing doors and briefly held onto the umbrella, but let it go after the train started.

This safety digest highlighted the importance of drivers making a final safety check of the platform-train interface and not relying on the interlock as an assurance that it was safe to move a train. It also underlined the need to ensure that drivers are properly supported in the task of train dispatch, not only through training and briefings but also through the maintenance of equipment and the need for train operating companies to continue to raise passenger awareness of the particular hazards that train doors can present.

A wider summary of previous RAIB learning, including similar trap and drag accidents and incidents, can be found on RAIB's [website](#).