RAIB

Rail Accident Investigation Branch

Rail Accident Report

Accident at Charing Cross station
24 November 2012

Report 10/2013
July 2013

This investigation was carried out in accordance with:

- the Railway Safety Directive 2004/49/EC;
- the Railways and Transport Safety Act 2003; and
- the Railways (Accident Investigation and Reporting) Regulations 2005.

Any enquiries about this publication should be sent to:

RAIB
The Wharf
Stores Road
Derby UK
DE21 4BA

Email: enquiries@raib.gov.uk
Telephone: 01332 253300
Fax: 01332 253301
Website: www.raib.gov.uk

This report is published by the Rail Accident Investigation Branch, Department for Transport.

Accident at Charing Cross station 24 November 2012

Contents

This page is left intentionally blank

Summary

On Saturday 24 November 2012, at 22:26 hrs, a member of the public fell between a train and the edge of platform three at Charing Cross (main line) station in London. The train began to move a few seconds after she fell; she came into contact with the wheels and suffered life-changing injuries. The train stopped after moving about 43 metres.

The train was dispatched by a member of staff on the platform, who operated an indicator which told the train driver when it was safe to start. The person approached the train after this indicator had been operated, and the dispatcher had no means of alerting the train driver to what had happened. The train was stopped by a passenger on board who operated the emergency communication handle. The person who was injured fell into the gap between the platform and the train bodyside, at a point between sets of train doors.

The RAIB has identified one learning point for the railway industry arising from this investigation, covering the particular hazards that should be addressed in the industry's response to the RAIB's previous recommendation concerning the train dispatch process, made following the investigation into a fatal accident at James Street, Liverpool, in October 2011.

Introduction

Preface

1 The purpose of a Rail Accident Investigation Branch (RAIB) investigation is to improve railway safety by preventing future railway accidents or by mitigating their consequences. It is not the purpose of such an investigation to establish blame or liability.

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

3 The RAIB's investigation (including its scope, methods, conclusions and recommendations) is independent of all other investigations, including those carried out by the safety authority, police, or railway industry.

Key definitions

4 All dimensions in this report are given in metric units. Where appropriate the equivalent imperial value is also given.

5 The report contains abbreviations and technical terms (shown in *italics* the first time they appear in the report). These are explained in appendices A and B.

The accident

Summary of the accident

6 On the evening of Saturday 24 November 2012, as the 22:26 hrs train to Dartford was departing from Charing Cross station in London, it struck a member of the public who had fallen from the platform onto the track, under the fourth of the six carriages of the train. The person was seriously injured.

7 Services from the station were disrupted for the rest of the evening.

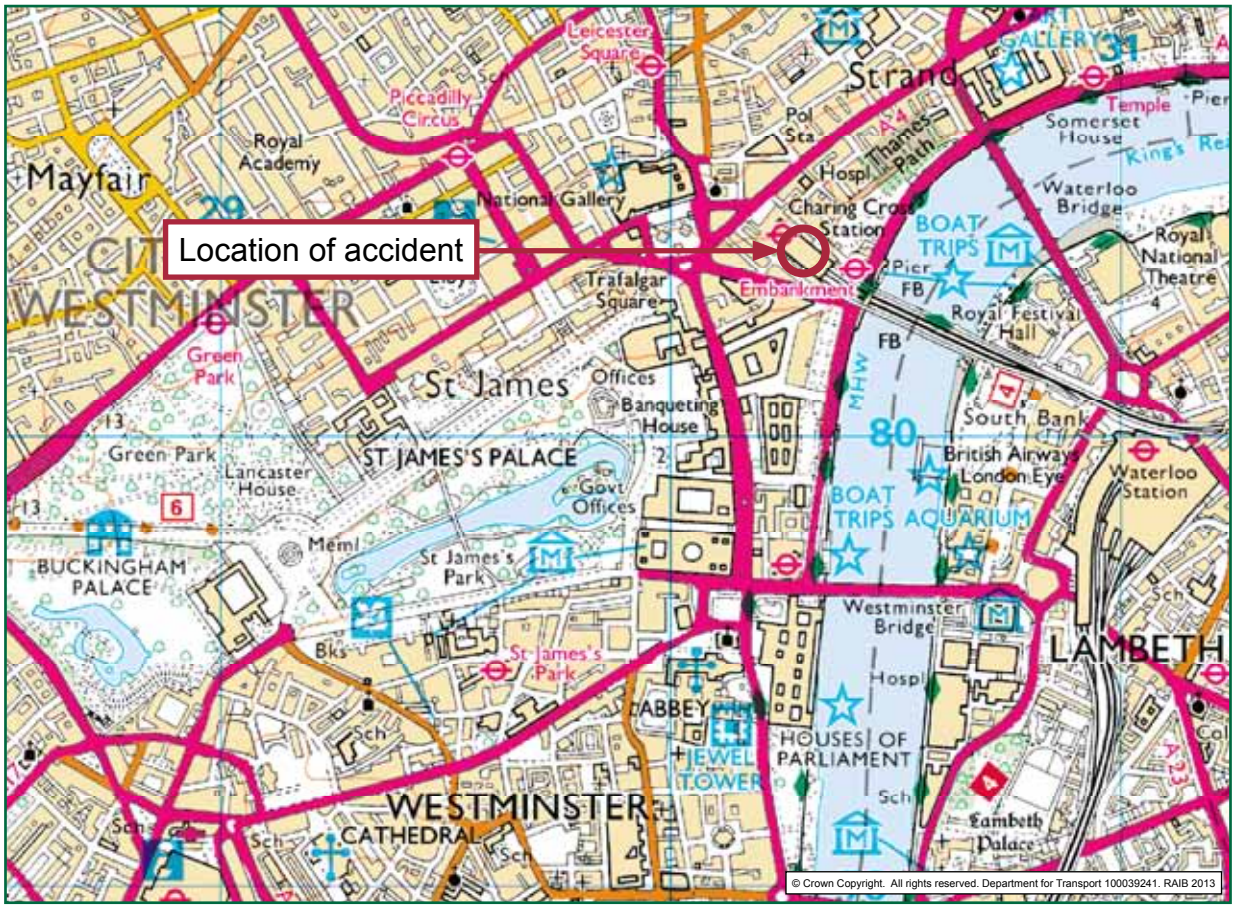

Figure 1: Extract from Ordnance Survey map showing location of the accident

Context

Location

8 Charing Cross is the terminus of main line and suburban services from south-east London and Kent, all of which are operated by *electric multiple unit* trains. It has six platforms, numbered from north-east to south-west. Platforms three and four are opposite faces of a platform which, at the point where the accident occurred, is straight and approximately 9 metres wide.

9 The platforms are covered by an overall raft, with a commercial office building above it, which extends as far as the footbridge about 110 metres from the buffer stops. The covered area is lit all the time that the station is open.

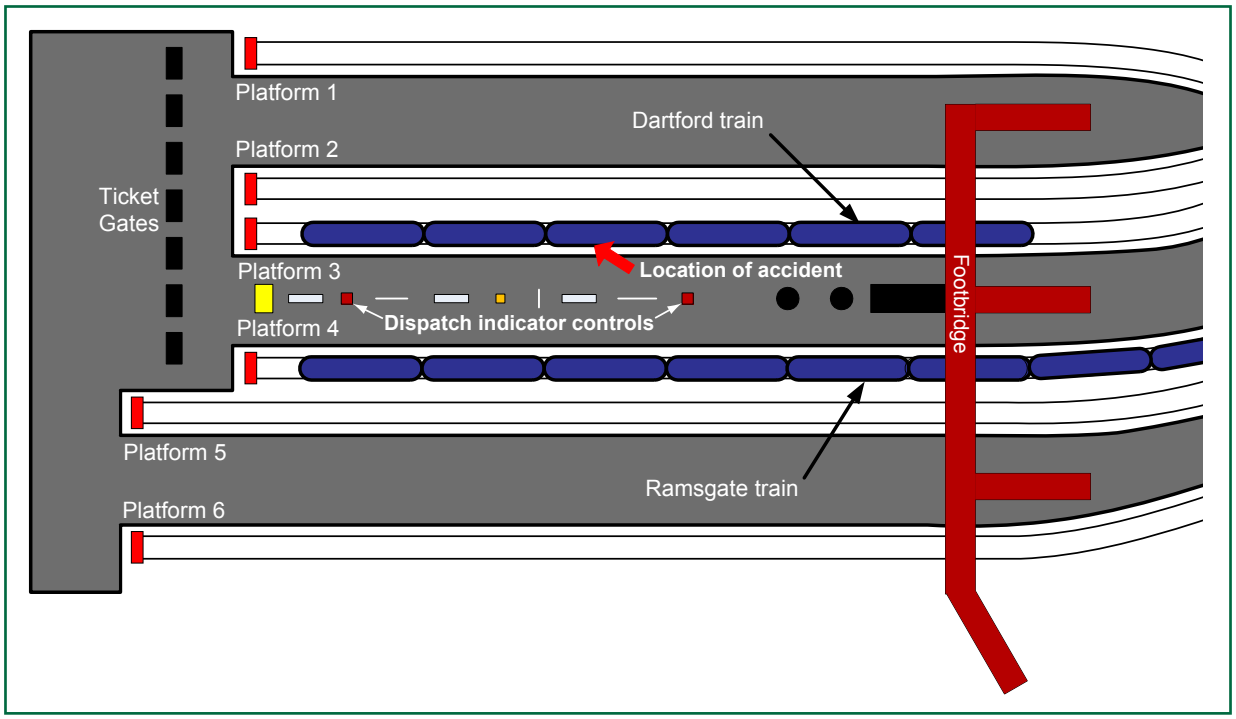

Figure 2: Layout of platforms at Charing Cross (not to scale - detail shown on platforms 3 & 4 only)

Organisations involved

10 Charing Cross main line station is owned and operated by Network Rail. Train services using the station are operated by London & South Eastern Railway Ltd, trading as Southeastern, which employs the staff responsible for supervising the platforms and dispatching trains.

11 Network Rail and Southeastern freely co-operated with the investigation.

Train involved

12 The six-car train consisted of a four-car unit (465017) and a two-car unit (466028) of 'Networker' stock, built in 1994. These trains have *sliding plug doors*, and can be operated by the driver without the need for a guard/conductor (referred to as driver-only operation (DOO)).

Rail equipment/systems involved

13 Platforms 3 and 4 at Charing Cross are provided with equipment to assist the dispatch of DOO trains, consisting of push-buttons on pedestals at two locations on the platform, and indicators which can be seen by drivers of trains.

14 The dispatch equipment is linked to the signalling system, which is controlled from London Bridge signal box. This equipment is described in detail in paragraphs 26 to 32.

People involved

15 The driver of the train was based at Slade Green depot, and was trained and certified by Southeastern to operate the type of train over the route concerned.

16 The customer service assistant who was responsible for operating the platform dispatch equipment had worked for Southeastern for two years, all that time at Charing Cross, and had been trained and certified by Southeastern in train dispatch.

17 The person injured was a 46-year-old woman from south-east London.

External circumstances

18 The part of platform three where the accident occurred is under the covered part of the station. The area is adequately lit, and the platform surface was dry.

Events preceding the accident

19 On the evening of Saturday 24 November the 19:50 hrs service from Ramsgate (the Ramsgate train) arrived at platform 4 at Charing Cross three minutes late at 22:24:30 hrs. This train was lightly loaded, with only about ten passengers, who alighted and moved along the platform towards the exits. There were about fifty people on the platform waiting to board the train, which was due to form the 22:40 hrs service to Ramsgate.

20 At the same time, passengers were joining the 22:26 hrs train to Dartford (via Greenwich) (the Dartford train) which was standing opposite, at platform 3. As its departure time approached, the last few passengers who had alighted from the Ramsgate train were approaching the London end of the platform.

Events during the accident

21 The customer service assistant in charge of platforms 3 and 4 began the dispatch process for the Dartford train about 22:25:30 hrs, thirty seconds before it was due to depart. By 22:25:51 hrs, the doors of the train had been closed by its driver, and the customer service assistant was then able to press a button on the control equipment on the platform which indicated to the train driver that it was safe to depart. Almost immediately afterwards, at 22:25:57 hrs, a woman who had got off the Ramsgate train and had been walking along the platform fell down between platform three and the Dartford train, just ahead of the rear set of doors of the fourth carriage. Her fall was seen by the customer service assistant, who called out and began to run along the platform.

22 Seven seconds after that (22:26:04 hrs), the train began to move. At 22:26:11 hrs, the customer service assistant arrived at the place where the person had fallen. A passenger on the train operated the emergency alarm, and the train stopped after moving about 43 metres, with the rear of the last carriage adjacent to where the person had fallen (22:26:20 hrs).

Events following the accident

23 The emergency services were called by the station staff, and were on the scene within ten minutes. The casualty was removed from the scene at 23:31 hrs and taken to hospital with serious injuries.

The investigation

Sources of evidence

24 The following sources of evidence were used:

- witness statements;
- the train's on-train data recorder (OTDR) data;
- closed circuit television (CCTV) recordings taken from cameras on platforms three and four;
- site photographs and measurements; and
- a review of previous RAIB investigations that had relevance to this accident.

Key facts and analysis

Background information

The method of train dispatch at Charing Cross

25 The method by which trains are dispatched from platforms three and four at Charing Cross is defined in the Southeastern 'Train Dispatch Guide' (December 2009) as method B, 'DOO train dispatched by station operatives using close doors (CD) and ready to start (RA) indicators'. Detailed instructions for these two platforms appear in the Southeastern working instructions for Charing Cross station.

26 The equipment provided for train dispatch consists of indicators, partly operated from pedestals on the platform. There are two pedestals, one near the ticket barrier and the other about seventy metres along the platform (figure 3). Staff are instructed to use an appropriate pedestal, depending on the length of the train to be dispatched. The driver has no means of viewing the side of the train, and relies on the platform staff to confirm that it is safe to move the train.

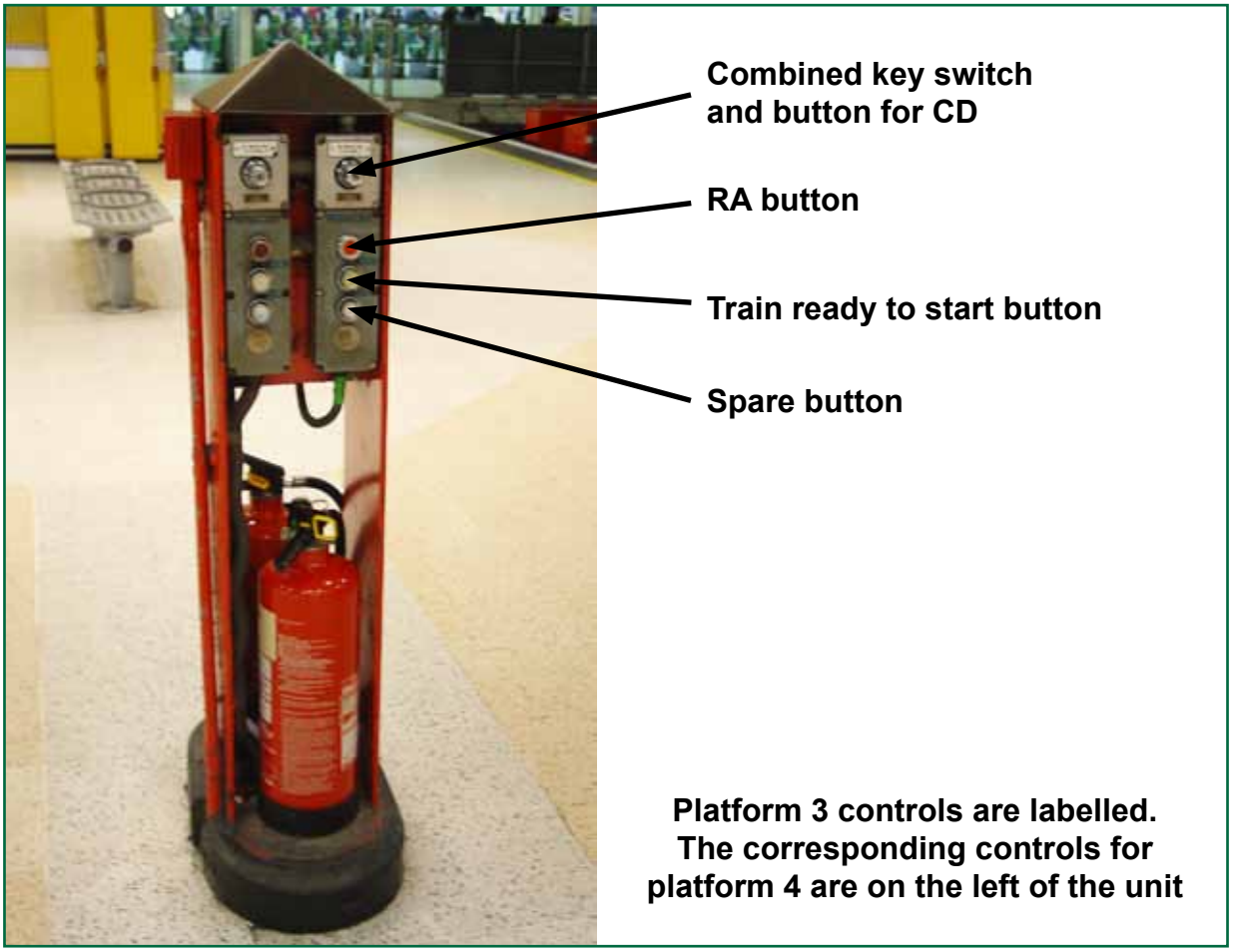

Figure 3: Dispatch controls for platforms 3 and 4 at Charing Cross

27 The indicators are positioned above the platforms, at locations where they are visible to the drivers of the various lengths of train that use the platforms. Each indicator consists of illuminated displays which show 'OFF' when the signal at the end of the platform is showing other than red, and are blank when the signal is showing red. Above the 'OFF' indication is a subsidiary indicator which can show blank, 'CD' or 'RA' (figure 4).

Figure 4: Dispatch indicators on Charing Cross platform 3

28 About one minute before the train is due to depart, the person in charge of dispatch (PICOD) inserts their key in the upper button on the control unit and presses the train ready to start (TRTS) button (figure 3). This is indicated in the signal box, and prompts the signaller to set the route for the train to depart. When this has been done, the signal changes to a 'proceed' aspect and the 'OFF' indicator is illuminated. The dispatch process can then begin.

29 Southeastern's instructions for dispatch method B are:

1. *When the train is ready to start and all passengers are clear, the **PICOD** and driver shall check any platform starting signal or indicator[1]. The **PICOD** shall blow a whistle to indicate the doors are about to close, and the train is ready to depart.*
2. *The **PICOD** shall then check the whole length of the train to make sure that it is safe to close the doors. Once satisfied, give the STATION WORK COMPLETE signal by operating the **CD** indicator.*

[1] The check is to confirm that the signal is showing 'proceed' or the indicator (where provided) is showing 'OFF'.

3. *The driver shall close the doors and check that the door interlock light[2] is lit.*
4. *The **PICOD** shall check along the whole length of the train making sure nothing is obstructing the doors, passengers are well clear of the train, **BIL**[3] lights are extinguished and the train is safe to depart.*
5. *If provided, the **PICOD** and driver shall check starting signal or indicator once again before departing.*
6. *The **PICOD** shall then give the READY TO START signal by using the **RA** indicator.*

There is no requirement for the PICOD to continue to observe the train once the RA indicator has been illuminated.

30 Southeastern's dispatch instructions for Charing Cross platforms three and four state that for trains formed of up to six coaches, the PICOD should use the CD/RA pedestal at the London end of the platform (near the ticket barrier), and that no assistance is necessary (ie the PICOD works alone), because in this case the PICOD can see the entire length of the train.

31 If everything is running smoothly, the staff at Charing Cross will begin the dispatch process about thirty seconds before a train is due to depart, by blowing a whistle to indicate that the doors are about to close. About twenty seconds before departure, the PICOD operates the 'CD' button. The train driver responds by closing the train doors, and this should be completed about ten seconds before departure time.

32 The PICOD then makes a final check of the platform and operates the 'RA' button, causing the indicator to illuminate about five seconds before departure time. The driver's reaction to this, and the operation of the train controls, should then result in the train beginning to move at the time it is due to depart.

Identification of the immediate cause[4]

33 **The person fell under the stationary train and came into contact with the wheels as it departed.**

Identification of causal factors[5]

34 The accident occurred due to a combination of the following factors:

- the person fell against the side of the train and into the gap just before the train started to move (paragraph 35);

[2] The door interlock light in the driver's cab indicates to the driver, when it is lit, that all the doors on the train are closed and locked.

[3] BIL stands for Bodyside Indicator Lights, the lights provided on the outside of each carriage which, when illuminated, indicate that the doors on that carriage are not fully closed and locked.

[4] The condition, event or behaviour that directly resulted in the occurrence.

[5] Any condition, event or behaviour that was necessary for the occurrence. Avoiding or eliminating any one of these factors would have prevented it happening.

- the gap between the platform edge and the train was large enough to fall through (paragraph 41); and
- there was no means of stopping the train immediately after the person was seen to fall (paragraph 49).

Each of these factors is now considered in turn.

The fall from the platform

35 **The person fell against the side of the train and into the gap just before the train started to move.**

36 The CCTV from the station shows the person walking along platform four, then crossing to the centre of the platform (towards platform three) as she approaches the location of the accident, about 60 metres from the ticket gate line.

37 She can then be seen to change direction and move quickly towards the train in platform three, fall against the side of it, and go down the gap between the train and the platform. Seven seconds later the train begins to move (see paragraph 50), and it is in motion for about sixteen seconds before stopping with its rear end close to the point where the person fell.

38 The RAIB has not positively established why the person fell against the side of the train. She has been unable to recall the accident or the events leading up to it. She had consumed some alcohol earlier in the evening, but the RAIB has been unable to determine the extent to which this affected her actions (if at all).

39 Railway staff receive training on how to deal with people who appear to have been drinking, if they seem to be in such a condition as to represent a danger to themselves or other passengers. However there is no evidence that staff had made any intervention with the person in this case.

40 It is not clear whether the injured person realised that the train that she was approaching was about to move, and it was no longer possible for her to board it. She is not likely to have been aware that the customer service assistant had already given the driver the indication that it was safe to depart (step 6 at paragraph 29). It is possible that she might have acted differently if there had been a clear visual and/or audible indication of this.

Platform/train gap

41 **The gap between the platform edge and the train was large enough for the person to fall through.**

42 The RAIB examined a class 465 train in platform three at Charing Cross. Class 465/466 trains have protruding steps at each doorway (figure 5). When these trains are alongside platform 3 at Charing Cross, the edge of the step is 100 mm horizontally clear of the platform edge, and the surface of the step is 240 mm above the level of the platform (figure 5).

43 Between the doors, the gap between the platform edge and the body of the train is 360 mm wide (figure 6). Below the edge of the platform there is a recess about 300 mm deep, which, although it is partly obstructed by cables, can provide a refuge clear of the train for a fallen body.

Figure 5: Class 465 train at Charing Cross platform 3

Figure 6: Bodyside of class 465 train in platform three at Charing Cross

44 The maximum stepping distance between platforms and trains is defined in Railway Group Standards[6]. This maximum dimension is intended to take account of considerations of safety and accessibility. At Charing Cross the step position for this type of train, relative to the platform, is compliant with the relevant standard (GI/RT7016) (figure 5 and table 1).

FOOTSTEP TO PLATFORM EDGE	Charing Cross platform 3 (mm)	Maximum permitted in standard (mm)
Platform edge to footstep: vertical	240	250
Platform edge to footstep: horizontal	100	275
Platform edge to footstep: diagonal	260	350

Table 1: measurements made at Charing Cross compared with industry requirements

45 Railway Group Standards define the dimensions of vehicles and positions of lineside structures with the aim of ensuring adequate clearance between trains on adjacent lines, and between trains and structures. The combination of the standard vehicle (GE/RT8073, C1) and structure (GC/RT5212, lower sector) gauges produces a specified minimum gap between platform and train of 253 mm at platform level (915 mm above rail height). This is to give space for the lateral and vertical movement of the vehicle body when travelling at speed. The profile of the class 465/466, and the position of the track adjacent to platform three at Charing Cross, means that for this combination of train and platform the gap is 360 mm. The railway industry does not set a maximum size for this gap.

46 During the investigation, the RAIB also measured the dimensions of the platform/train interface on the other platforms at Charing Cross, for all three types of train that are normally timetabled to use the station (classes 465/466, 375 and 376). The stepping distances and platform/bodyside gaps were broadly similar for all trains on the straight portions of the platforms. Where the tracks curve, at the south-east end of the station, the gap between platform and bodyside is up to 450 mm.

47 The RAIB commented on the size of the gap between some trains and platforms, and the ways in which this might be reduced, in its report into the fatal accident at James Street, Liverpool, on 22 October 2011 (report 22/2012, circulated to the railway industry in October 2012). The report also discussed the changes in the design of the bodyside profile of trains over the years, leading to an increase in the size of the gap, and identified that the number of different types of trains that are likely to use a station is a factor in the potential size of the gap.

48 In view of the action that is reported as being taken by the railway industry in response to the James Street report (see paragraph 69), the RAIB is not making any recommendations in this report in relation to the management of the gap between the train and the platform.

[6] Railway Group Standards are published and maintained by RSSB, formerly known as the Rail Safety and Standards Board.

Movement of the train after the person had fallen from the platform

49 It was not possible to stop the movement of the train before the person had come into contact with the wheels.

50 The CCTV shows that the person fell about six seconds after the train doors finished closing, and seven seconds before the train began to move. During the whole of this period, the customer service assistant was close to the pedestal near the London end of the platform, observing the platform and train. She operated the 'RA' control once she was satisfied that the doors were closed, there was no-one on the platform close to the train, and that it would be safe for the train to leave. CCTV evidence confirms that this assessment was correct at the time it was made.

51 The customer service assistant operated the 'RA' control just before the person, who had been walking towards the exit, suddenly changed direction, moved quickly across the platform, and fell against the train. It was then impossible for the customer service assistant to do anything to prevent the departure of the train. The reaction of the driver to the 'RA' indication, the response of the train's systems to the driver's operation of the power/brake control handle, and the time required to release the brakes, means that there is normally up to seven seconds between the appearance of the 'RA' indication and the train starting to move.

52 Once the 'RA' control has been operated, the platform staff have no ability to cancel it, and the indication remains illuminated until the train passes the signal at the end of the platform, at which time the signal returns to red and the 'OFF/RA' indication (figure 4) goes to blank.

53 The customer service assistant, who had no other immediate means of communicating with the driver, began to shout and run down the platform. A passenger inside the train, alerted either by the sound of the person falling against the train or the shouts of the customer service assistant, operated the passenger emergency alarm 8.5 seconds after the train began to move. The driver responded immediately and applied the brakes, and the train stopped about seven seconds later.

54 There are several different methods of dispatching DOO trains. On platforms where there are no staff, the platform is normally equipped with CCTV monitors or mirrors, which enable the driver to observe all the doors on the train. Drivers are required to use these to make a final safety check of the train after the doors are closed, and before the train moves off. As soon as the train begins to move, these monitors or mirrors pass out of the driver's view.

55 Class 377 trains operated by Southern, and class 379 trains operated by Greater Anglia, are equipped with external CCTV cameras which cover the area along the sides of the train, and provide images which are displayed in the cab. These images are suppressed once the train has begun to move. It is important that the driver is not distracted from observing signals and the line ahead during departure from stations.

56 Some operators use methods of train dispatch which permit the driver to observe the platform as the train leaves, so that it is possible to respond to incidents which occur while all or part of the train is still in the platform. On the Victoria, Central, Jubilee and Northern lines of London Underground, trains are equipped with in-cab CCTV which receives images from cameras on the platform. These are displayed to the driver while the train is at the platform and while it leaves the station. The signalling system on London Underground has a signal at the end of each platform with a 'train stop' facility which provides protection from hazards which may arise from the driver's attention being distracted from the view ahead during this period.

57 Some stations on the London Underground system, on the Victoria, Jubilee and Central lines, are equipped with emergency stop buttons on the platforms, which can be operated by staff and the public to stop trains if an incident occurs during departure. These are linked to the automatic train operation system that is used on those lines. There is no similar system on the other London Underground lines, or on the national network.

58 RSSB has previously commissioned research into the risks associated with this area of train operation, and the results of this were published in 2006 as paper T426 'Minimisation of Accidents at the Platform Train Interface'. The authors of this study reported (paragraph 1.4.3):

> 'The judgement from industry experts gained during the study is that the biggest single gap in the control measures is the inability of station staff to stop certain types of train as the train moves along the platform during train dispatch, thereby increasing the consequences from a dragging incident. Consideration should be given to control measures for managing this risk.'

59 Observation of the platform/train interface by a member of staff (driver, guard or platform dispatcher) during the departure of a train has the potential to prevent this type of accident from resulting in serious injury if the person observing has the ability to stop the train quickly. Recommendations 1 and 3 of the RAIB's report into the James Street accident (see paragraph 68) cover the desirability of continuous surveillance of the platform/train interface.

Previous occurrences of a similar character

60 The RAIB has previously investigated five accidents in which people have been killed or injured after falling under trains departing from stations. A full list of these, as well as details of some that were not investigated by the RAIB, is given in the report into the accident at James Street, Liverpool, referred to in paragraph 47.

61 In the James Street accident, a young person was killed when she fell down the gap between the platform and a departing train, after leaning against the train while it began to move. The gap between the platform edge and the train at James Street was slightly less than the gap at Charing Cross.

Subsequent incidents

62 At Bishop's Stortford, Hertfordshire, on 9 January 2013, a person who had just got off a train (the 18:24 hrs from London Liverpool Street to Stansted Airport) approached it again, and fell between the train and the platform as it departed. He was run over by the train and seriously injured. The RAIB carried out a preliminary examination of this accident, which found that the injured person was clear of the train and behind the yellow line on the platform at the time the doors were closed and remained behind the yellow line until after the train started to move 10 seconds later. The injured person then approached the train as it was moving, to look through a window for an item of lost property, and stepped into the gap between the train and the platform, which at that point was about 330 mm wide.

63 The RAIB found no evidence that the dispatch of the train was incorrect or contributed to the accident, or that the driver could have taken any action to avoid the accident if he had been aware of a person walking alongside the train. The train involved in the accident is equipped with in-cab CCTV screens which, for the reasons mentioned in paragraph 55, are suppressed when the driver starts the train. The RAIB has decided not to carry out any further investigation of this accident.

Summary of conclusions

Immediate cause

64 The person fell under the stationary train and came into contact with the wheels as it departed (**paragraph 33**).

Causal factors

65 The person fell against the side of the train and into the gap just before the train started to move (**paragraph 35, Learning point 1**).

66 The gap between the platform edge and the train was large enough for the person to fall through (**paragraph 41, Learning point 1**).

67 The person's serious injuries resulted from there being no means for the customer service agent to stop the train after the person fell and before it struck her (**paragraph 49, Learning point 1**).

Previous RAIB recommendations relevant to this investigation

68 The following recommendation was made by the RAIB as a result of a previous investigation, which addresses factors identified in this investigation. It is therefore not remade so as to avoid duplication:

Fatal accident at James Street, Liverpool, on 22 October 2011 (report 22/2012), published October 2012

Recommendation 3

The Office of Rail Regulation should, in conjunction with railway industry parties, ensure that the findings of this report are taken into account in published guidance on the types of measures that promote the safe movement of trains from platforms through the adequate control of risk.

The areas that should be the subject of particular consideration in such guidance are:

a. equipment and methods which enable the person responsible for dispatch to observe the platform/train interface without interruption for as long as possible, ideally until the train has left the platform;

b. equipment and methods which enable the person responsible for dispatch to stop a train quickly in an emergency; and

c. adaptation of trains and infrastructure to reduce the size of the platform edge gap when this is possible and appropriate, for example in connection with investment in new trains and infrastructure.

Action reported as taken by industry is summarised in paragraph 69. The ORR has not yet formally reported its assessment of the adequacy of the industry's response.

Actions reported as already taken or in progress relevant to this report

69 RSSB reports that, in response to recommendation 3 of the James Street investigation quoted above:

- On 27 March 2013 it held (jointly with ORR) a workshop on the management of the platform/train interface (PTI), which was attended by a large number of industry representatives. RSSB is working with the railway industry to develop guidance on PTI issues, based on the ideas put forward at the workshop for improving safety in this area.
- The module of the railway rule book which deals with the dispatch of trains from stations (module SS1) has been rewritten, and the rules relating to dispatch have been strengthened and clarified. The guard (where one is provided) is now required to remain in position at the door controls until a departing train has passed clear of the platform.
- A proposal for research into the design and use of devices to reduce the train/platform gap is being developed by RSSB. Such devices include gap fillers attached to the edge of the platform, and additional panels on train body sides.

70 Southeastern reports that it is revisiting its risk assessments for station operations. It is using an integrated approach to stepping distance, yellow line position and dispatch methods, which has included the involvement of local staff and representatives of train crew in considering the platform management and dispatch methods at stations. This process has been based on a dispatch risk assessment template produced by RSSB, as part of Rail Industry Standard RIS-3703-TOM 'Passenger Train Dispatch and Platform Safety Measures', published in March 2013.

Learning points[7]

71 The RAIB notes that the railway industry is currently considering its response to the recommendations made in the investigation into the fatal accident at James Street, Liverpool on 22 October 2011 (paragraph 68). The investigation into the accident at Charing Cross has highlighted the risk associated with particular aspects of the train dispatch process, and the RAIB believes that the following points should be addressed by the industry in its response to the James Street recommendations:

- the possibility of providing a warning to people on the platform that a train is about to move (paragraph 65);
- a review of the standards relating to the clearance between trains and platforms (paragraph 66);
- the practicability of adding gap fillers at platforms used only by trains travelling at low speed (paragraph 66);
- the possibility of providing means for platform staff to remove the RA indication after it has been given, possibly also causing the signal at the end of the platform to revert to red, or giving some other indication of an emergency to the train driver (paragraph 67); and
- the potential for using enhanced radio systems (such as GSM-R) to provide a means for platform staff to send an 'emergency stop' message to drivers.

The RAIB will be writing to the ORR to draw its attention to these learning points as the ORR is already monitoring the railway industry's response to the recommendations made by the RAIB in its James Street investigation.

[7] 'Learning points' are intended to disseminate safety learning that is not covered by a recommendation. They are included in a report when the RAIB wishes to reinforce the importance of compliance with existing safety arrangements (where the RAIB has not identified management issues that justify a recommendation) and the consequences of failing to do so. They also record good practice and actions already taken by industry bodies that may have a wider application.

Appendices

Appendix A - Glossary of abbreviations and acronyms

CCTV	Closed Circuit Television
CD	Close Doors
DOO	Driver-Only Operation
PICOD	Person In Charge Of Dispatch
RA	Right Away
TRTS	Train Ready To Start

Appendix B - Glossary of terms

All definitions marked with an asterisk, thus (*), have been taken from Ellis's British Railway Engineering Encyclopaedia © Iain Ellis. www.iainellis.com.

Electric Multiple Unit	A train that can be driven and controlled as a single unit from the driving cab at the leading end and whose motive power is electricity supplied externally from overhead line equipment (OLE) or conductor rails.*
Railway Group Standards	A document mandating the technical or operating standards required of a particular system, process or procedure to ensure that it interfaces correctly with other systems, process and procedures.* Railway Group Standards are published and maintained by RSSB.
Sliding plug doors	A type of powered door system in which, during opening, the door leaf initially moves out and clear of the carbody before sliding open.*

This page is left intentionally blank

This report is published by the Rail Accident Investigation Branch,
Department for Transport.

Any enquiries about this publication should be sent to:

RAIB
The Wharf
Stores Road
Derby UK
DE21 4BA

Telephone: 01332 253300
Fax: 01332 253301
Email: enquiries@raib.gov.uk
Website: www.raib.gov.uk