

RAIB Bulletin 02/2013

Near miss at Southwark Bridge Junction, near Elephant & Castle station, London, 21 January 2013

Description of the incident

- At approximately 07:30 hrs on Monday 21 January 2013, train 1E81 (the 05:54 hrs service from Bedford to Sevenoaks) and train 2E11 (the 06:40 hrs service from St Albans to Sevenoaks), both operated by First Capital Connect in conjunction with Southeastern, were travelling towards each other, on the same track north of Elephant & Castle station (figure 1). The trains, both class 319 electric multiple units, stopped when they were about 160 metres apart.

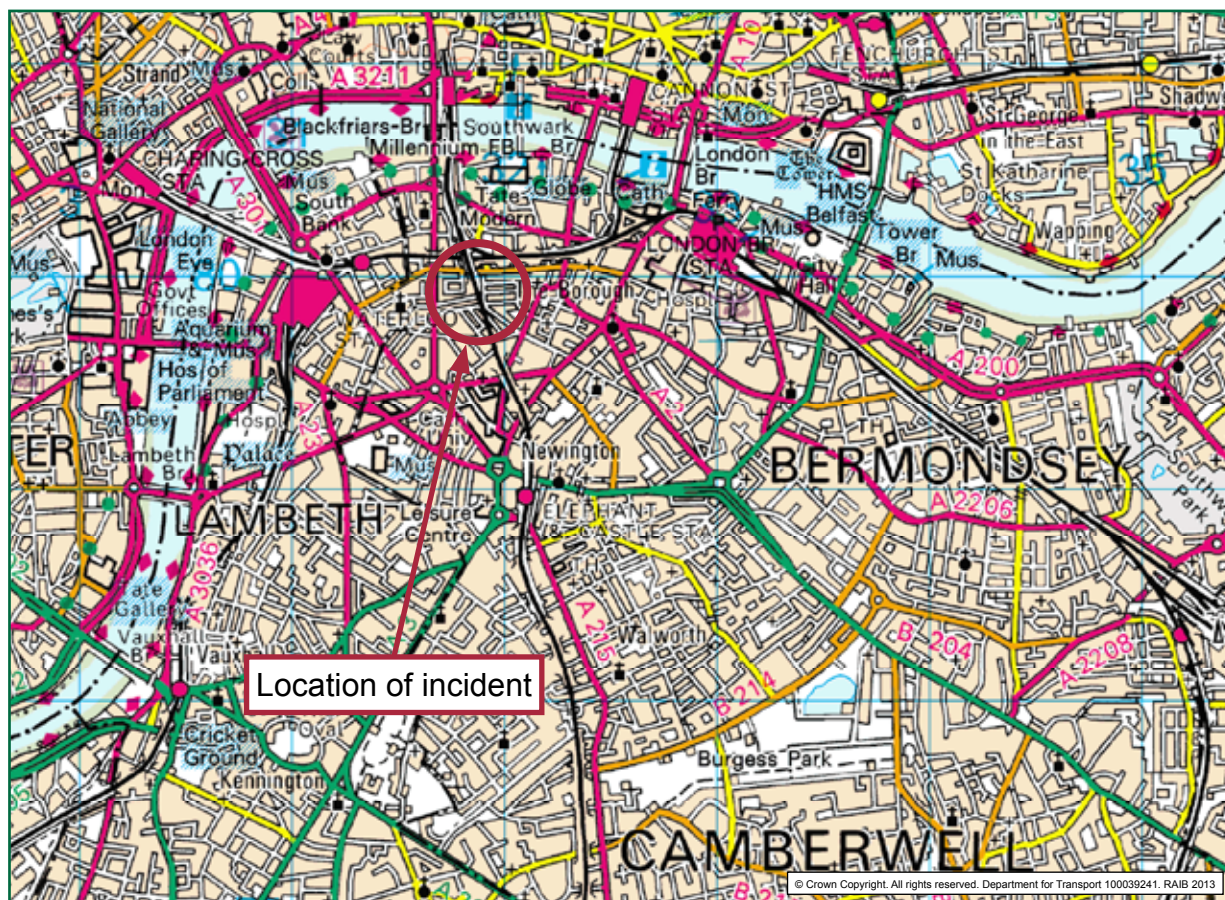


Figure 1: Extract from Ordnance Survey map showing location of incident

Sequence of events

Train 1E81

- 2 At 07:02 hrs, train 1E81 left Elephant & Castle station on the Down¹ Holborn Fast line, heading south (figure 2), and then encountered problems picking up power due to ice on the conductor rail². About 1.5 miles (2.4 km) south of Elephant & Castle the train was unable to proceed further, so the driver contacted the Network Rail signaller and agreed to move to the rear driving cab, ready to return towards Elephant & Castle. Having made an announcement to passengers that the train was not proceeding any further, the driver was asked by some of them if they could alight at Elephant & Castle station.
- 3 The signaller responsible for the Elephant & Castle area contacted the driver to authorise a wrong direction move (a train movement in the direction opposite to that which trains normally run, and not controlled by signals). The signaller instructed the driver to move 'back into Elephant & Castle to stand behind Victor Sierra One Zero Nine One'. The signaller's choice of words in this message was in accordance with the railway industry's communications protocol, by use of the phonetic alphabet and individual digits, when referring to signal number VS1091. This was the signal at the south end of Elephant & Castle station, which controls southbound trains (figure 2). The driver's response to the signaller indicated that the driver believed he had understood the message.
- 4 The driver drove the train to Elephant & Castle station, reaching a maximum speed of 23 mph (37 km/h). On arrival at the station he stopped the train and allowed passengers to disembark. After 50 seconds, at approximately 07:31 hrs, the driver restarted the train, heading towards signal VS1340 (figure 2), the first signal controlling northbound movements on the Down Holborn Fast line. During this movement, train 1E81 reached a maximum speed of 17 mph (27 km/h) and passed over and damaged points³ 6078, which were set as part of the route for train 2E11 to travel from the Down Holborn Fast line to the Down Holborn Slow line.

¹ A down line is a track on which the normal passage of trains is in the down direction, ie away from London, or towards the highest mileage.

² An additional rail used to convey and enable collection of electrical traction current at track level. The conductor rail is energised at around 750 volts.

³ A section of track with moveable rails that can direct a train from one track to another.

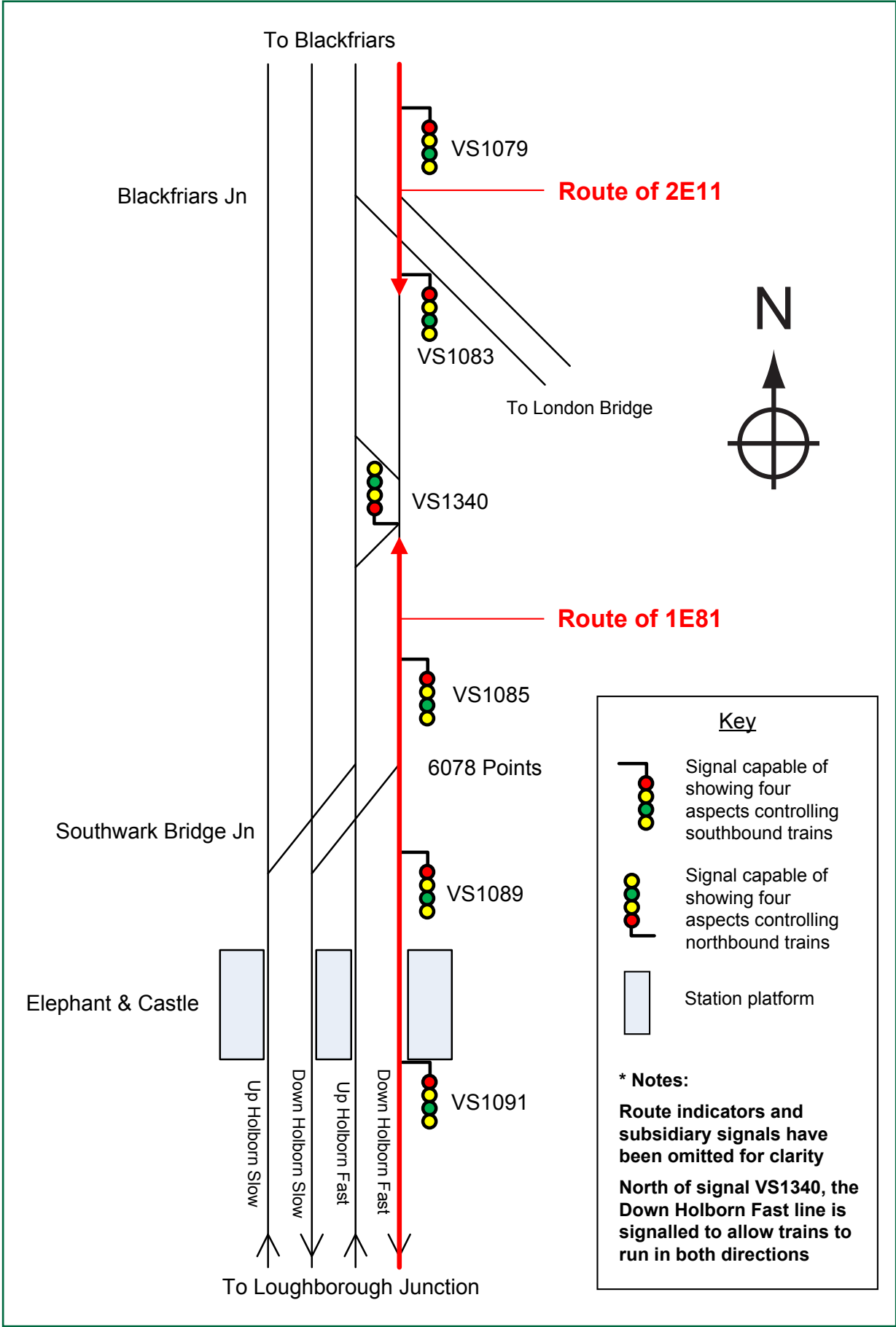


Figure 2: Track and signalling diagram (showing only relevant signals)

Train 2E11

- 5 Train 2E11 was travelling south towards the crossing from the Down Holborn Fast line to the Down Holborn Slow line. It stopped at signal VS1079, to allow a train that was coming from London Bridge to pass. The signal then changed to green, the train moved forward and the driver could see that the next signal (VS1083) was showing a double yellow aspect⁴, which changed to single yellow⁴ after 52 seconds. At 07:32 hrs, train 2E11 was travelling at less than 10 mph (16 km/h) as it passed signal VS1083. Signalling records show that this signal changed from a single yellow aspect to a red aspect⁴ at approximately the time that the train passed it. This is consistent with the driver stating that he only observed the single yellow aspect before the train was stopped automatically by the TPWS⁵ (Train Protection and Warning System). As train 1E81 travelled in the wrong direction it occupied track circuits⁶ that affected the operation of signal VS1083. This caused the signal to change to a single yellow aspect, and then to a red aspect.

Signaller

- 6 At 07:32 hrs, the signaller saw on his display screen that train 1E81 was moving beyond Elephant & Castle station, and so had passed the point that he had authorised it to proceed to. He also saw that train 2E11 was on the same line, and moving towards 1E81. He used the radio to call the driver of 2E11 to instruct him to stop, but 2E11 had already been stopped by the TPWS at signal VS1083.
- 7 The signaller then radioed the driver of train 1E81 at 07:33 hrs and instructed him to stop. At this time train 1E81 was moving at approximately 10 mph and decelerating towards signal VS1340, which was showing a red aspect. When both trains had stopped, they were facing each other, about 160 metres apart, on the Down Holborn Fast line.

RAIB Investigation

- 8 The control of safety of the wrong direction move was reliant on effective voice communications between the signaller and the driver of 1E81. The intended move was compliant with the requirements of the railway rule book, including the requirement for the wrong direction move to stop at least 400 metres clear of the route of other trains.

⁴ The signals in this area can show four aspects (combinations of coloured lights), to indicate whether the driver has to stop, has to prepare to stop or can proceed with or without restriction. The aspects show:

- Green: proceed, the next signal may be displaying green or double yellow;
- Double yellow: caution, the next signal may be displaying a single yellow;
- Single yellow: caution, the next signal may be displaying a red stop signal; and
- Red: stop.

⁵ An automatic trackside and trainborne system which automatically applies the brakes of trains that pass signals at danger so as to mitigate the risk of a collision.

⁶ Electrical circuits in the running rails that are used by the signalling system to identify the location of trains.

- 9 The voice communications used by the driver of 1E81 and the signaller (see appendix) were non-compliant with Module G1 of the railway rule book in a number of respects:
- The driver did not repeat the message back to the signaller, but he did indicate that he believed he had understood;
 - The signaller was required to lead the conversation⁷, but this authority was undermined by the way in which the driver responded to the signaller (see appendix); and
 - The signaller did not insist that the driver repeat the message back to him to demonstrate his understanding.
- 10 The signaller specified the intended stop location for the train using the signal identification number, which was familiar to him and visible on his display screen. The driver was not, and is not required by his training to be, familiar with all the signal numbers on his route. Each signal carries a plate showing the signal number, facing towards trains moving in the direction controlled by that signal. The signal mentioned in the signaller's instruction (VS1091) controlled southbound trains, and so the number could not be seen by the driver of train 1E81, as he approached it heading north (figure 3).
- 11 The driver has stated he was unclear about the precise location of the signal that the signaller had specified, but was aware that there was a signal beyond Elephant & Castle controlling his direction of travel. The driver has stated he believed this was where the signaller had intended him to stop, and he only stopped at Elephant & Castle in response to passenger requests (paragraph 2). The driver did not appreciate that the specified signal number was likely to be facing southbound trains (signals for the down direction usually have odd numbers, while those for the up direction usually have even numbers).
- 12 Both the driver and the signaller had received safety related communications training, focused on the need to use the phonetic alphabet and to repeat back messages to avoid misunderstanding.
- 13 The signaller contacted the drivers of the two trains in turn, using the cab secure radio⁸, to instruct them to stop. He could have chosen to issue a 'stop all trains' command on the cab secure radio system which would have affected all trains between Farringdon and Loughborough Junction. This would have brought the two trains to a stop more quickly and in other circumstances may have been necessary to prevent a collision. The signaller had never used a 'stop all trains' command before, and he chose to contact the trains individually, allowing him to confirm verbally that each train had stopped.

⁷ The rule book requires the signaller to take lead responsibility for ensuring the accurate transfer of information, when communicating with drivers.

⁸ The cab secure radio system allows signallers and train drivers to talk directly to each other. In future, this facility will be provided by GSM-R (Global System for Mobile Communications - Railway) radio equipment. The trains involved in this incident were not fitted with GSM-R equipment at the time of the incident.



As viewed by the driver of a southbound train



As viewed by the driver of a northbound train

Figure 3: Signal VS1091

Learning Points⁹

- 14 This incident highlights the importance of effective communications during safety critical activities. It is essential that both parties come to a clear understanding of the message that is being conveyed. The responsibility for this lies with both parties. In particular:
 - signallers should not rely on train drivers knowing the identification number of a signal unless the driver is approaching from the direction in which the front of the identification number plate can be seen;
 - when giving a landmark to a train driver, a signaller should do so in clear and simple terms, and ensure that the driver gives a positive confirmation that he knows the position of that landmark; and
 - repeating back the words of a message may be insufficient to determine that the meaning has been understood.
- 15 Responsibility for leading a safety critical conversation should be carried out in an assertive manner, and not be allowed to be undermined by the responses of the other party.
- 16 Managers, and refresher training, should encourage signallers to actively consider use of the 'stop all trains' radio command when they need to stop more than one train in an emergency.

⁹ 'Learning points' are intended to disseminate safety learning that is not covered by a recommendation. They are included in a bulletin 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.

Appendix

Transcript of Signaller to 1E81 Driver Communications

- Driver – Hello signaller One Echo Eight One.
- Signaller – Hello driver One Echo Eight One. This is area One Six Victoria signalman. You are at a stand and you have changed ends.
- Driver – North cab, waiting at Elephant & Castle.
- Signaller – That's it, sir, yeah. Right, OK, so you are ready to make your move to come back to Elephant & Castle are you?
- Driver – I am, signaller, yes.
- Signaller – OK. Right. I am just checking so there's no points in the route. So I'll just confirm the route has been checked for you to make your return journey. So you'll be going wrong direction, on the Down Holborn Fast...
- Driver – That's correct, signaller.
- Signaller – ... back into Elephant & Castle to stand behind Victor Sierra One Zero Nine One.
- Driver – That is correct signaller.
- Signaller – OK. So if you are ready to make the move, sir, you have my authority to make that move. Proceed with caution. Be prepared to stop short of any obstruction. And once you have completed your move, and you are back behind Victor Sierra One Zero Nine One, if you could call me and let me know.
- Driver – Message received, signaller.
- Signaller – Thank you very much sir.
- Driver – Thank you very much, indeed.
- Signaller – Signaller out.

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