



Rail Accident Investigation Branch

RAIB Bulletin 05/2010

Train door incident at Liverpool Street, London on 4 February 2010

The incident

1. A passenger train left Liverpool Street station with all the doors on one side of the train open, and travelled 500 metres before being stopped.
2. The incident occurred on 4 February 2010. The 08:33 hrs service from Liverpool Street to Chingford, an 8-coach electric train formed of units 317505 and 317508, departed on time. As it left platform one, the dispatcher on the platform observed that the doors of the train were still open. She tried to attract the attention of the driver by blowing a whistle, but was unsuccessful.
3. The dispatcher telephoned the signalling centre at Liverpool Street and told the signaller what had happened. The signaller used signals to stop the train at the second signal out of the station on the Down Suburban line, and spoke to the driver over the Cab Secure Radio system.
4. While the train was moving out of the station, one of the approximately twenty passengers on the train closed some of the open doors using the buttons in the vestibules, and then went to the front of the train and spoke to the driver as the train came to a stop.
5. After confirming what had happened with the passenger and the signaller, the driver secured the doors, changed ends and drove the train back into the same platform at Liverpool Street station.
6. There were no injuries, and no damage was caused in the incident.

Findings of the RAIB: sequence of events

7. The RAIB examined the train at Liverpool Street station and subsequently collected documents and witness evidence related to the incident.
8. When the train was examined after the incident, the traction interlock switch (TIS) in the country (north) end cab of unit 317505 was found to be in the 'cut out' (isolated) position. The TIS is located on the cab bulkhead behind the driver's seat, and is one of a row of three switches. The other two switches in the row control lights in the gangway and vestibule adjacent to the cab (figure 1). This meant that it was possible for the driver to apply power to move the train although the doors were not closed and locked. The rule book (module TW5 section 33.1) prohibits a train from entering service from a maintenance depot (such as Ilford) if the TIS is unsealed or isolated. Section 33.2 of module TW5 prohibits a train from entering service from somewhere other than a maintenance depot (such as Chingford sidings) if the TIS is isolated.



Figure 1: Switches on cab bulkhead of class 317, showing TIS in normal position with glass seal intact

9. The unit involved, 317505, had been out of service at Ilford depot from 22 January to 3 February for investigation of traction motor problems and replacement of a defective compressor. It was released from Ilford on the morning of 3 February and CCTV evidence indicates that it was prepared for service by depot staff.
10. The On Train Data Recorder (OTDR) showed that the TIS had been cut out while the unit was in Ilford depot, and was still in this state up to the time of the incident on 4 February. There are several reasons why this may need to be done. In particular, on 29 January the unit went on a test run in connection with the investigation of a traction motor fault. On this run, monitoring equipment inside the train was connected to the traction motors by cables passing through one set of doors, which had to remain partly open for this purpose. With the doors partly open, it was necessary to cut out the TIS to enable the test run to be carried out. To cut out the TIS it is necessary to break a glass rod which obstructs movement of the switch. The remains of this rod were found on the cab floor after the incident.
11. The person who prepared the train at Ilford depot did not notice that this sealing rod had been broken and that the TIS was in the 'cut out' position. A check on this switch, and a test of the correct operation of the traction interlock by attempting to take power with the doors open, is part of the train preparation process which should have been followed before the unit was released from the depot for service on 3 February. There are two 'depot drivers' at Ilford depot. One of them was not aware of the requirement to test for power with the doors released. The other had been trained to do this, but had been advised not to do it at Ilford depot because it was not possible to carry out a power test without activating the depot protection system within the shed at Ilford.
12. The train then operated in service on 3 February, and was stabled at Chingford overnight on 3/4 February, coupled to unit 317508. A driver from Chingford depot was due to prepare 317505 and 317508 for service during the night, carrying out the same process as should have been followed at Ilford. He knew that he was supposed to prepare this train, but did not carry out this part of his duty.

13. The train entered service from Chingford sidings at 06:05 hrs on 4 February. It was driven to the station by another driver, who left it in platform 3. The driver who was later involved in the incident then took the train over, and departed for Liverpool Street in passenger service, calling at intermediate stations, at 06:25 hrs.
14. At Liverpool Street the driver changed ends and drove the train to Enfield Town and back, calling at all stations on both journeys. The train arrived a few minutes late at Liverpool Street at about 08:29 hrs, and was due to depart again for Chingford at 08:33 hrs. The incident then occurred.

Key Factors

15. None of the drivers who drove the train on 3 February, or the two who drove it on the morning of 4 February, noticed that the TIS was cut out, although their duties did not specifically require them to check this.
16. The OTDR shows that when the driver who was involved in the incident changed ends at Liverpool Street on 4 February, he did not activate the door control system. This should be done by putting a key in the door key switch, which is also located on the cab bulkhead, and then turning the adjacent switch from 'off' to 'on'. Witness evidence suggests that although the driver put his key in and turned it, he did not operate the separate switch. This meant that, when he pressed the 'Doors Close' button on the control desk in front of him, the doors did not respond. Putting the key in and then operating the door key switch is a normal and routine part of the process of setting up the cab for departure, and the driver is unable to explain why he did not complete the process on this occasion. The driver had over twenty years experience of driving this class of train. There is no evidence that he was distracted by any external factors such as use of a telephone, but he was aware that the signal at the end of the platform was already showing green in readiness for the departure of the train.
17. There is a blue 'pilot' light above the windows on both sides of the cab which illuminates when traction interlock is obtained, i.e. when the doors are properly closed. It is not possible to see this light when sitting in the driver's seat without turning round and looking up. Drivers of class 317s have become accustomed to listening for the sound of the warning alarms that indicate to passengers that the doors are closing, followed by a click as the interlock is achieved, rather than looking at the pilot light to confirm that the doors are closed. In this case the driver would not have heard either of these sounds.
18. At Liverpool Street station, trains are dispatched from platform 1 by platform staff using a key switch to make 'CD' appear on an indicator suspended above the track ahead of the train (figure 2). This sign indicates to a driver that the train doors should be closed. When the doors are closed, and all the lights on the outside of each coach have gone out, the platform staff (the dispatcher) should then use another key switch to make 'R' appear on the indicator ahead of the driver. Only when 'R' appears should the driver understand that it is safe to take power and move the train. On this occasion the dispatcher was still waiting for the doors to close when the train moved off, although the driver thought that he saw the 'R' displayed. The data recorder in Liverpool Street signalling centre confirms that 'R' was not displayed before the train left.



Figure 2: View from cab of train in platform 1 at Liverpool Street, showing 'CD' display

19. Witness evidence suggests that a few drivers may have become accustomed to sometimes pressing the 'doors close' button and taking power simultaneously, so that the train begins to move as soon as the traction interlock is obtained.
20. Module TW5 of the rule book has a red-bordered reminder in section 33:

When the traction interlock is isolated, a vital safeguard is removed.

Conclusions

21. The RAIB has conducted a preliminary examination of the circumstances and key evidence associated with the incident at Liverpool Street on 4 February, and decided that further investigation by the RAIB would be unlikely to result in significant recommendations for the improvement of safety. However, the examination has highlighted six learning points, which are described at paragraph 27.
22. The immediate cause of the incident was that the driver applied power without confirming that the train doors had closed, and without seeing the 'R' indication on the display ahead of the train.
23. Causal factors were:
 - the driver had not activated the doors by means of the key switch when he entered the cab; and
 - the TIS was unsealed and isolated, and this had not been detected by two people who were supposed to have prepared the train.
24. Underlying factors were the design of the class 317 cab, with the door interlock lights located out of a seated driver's range of vision, the design of the TIS which made it easy for a driver to miss the fact that it was isolated, and the casual methods of working adopted by a few drivers in sometimes taking power before the traction interlock is obtained.

25. National Express East Anglia is modifying the TIS on the class 317 units which it operates, by fitting a cover over the switch which can only be closed when the switch is in the 'normal' position, and displays a patch of contrasting colour when the switch is in the 'cut out' position. A similar modification has already been applied to the class 315 units operated by the company, and is intended to make it easier for train preparers and drivers to see that the TIS is isolated. Once this modification has been completed, the company proposes to remove the requirement to test the operation of the traction interlock from the train preparation process. RAIB has written to the other operator of class 317 units to bring this matter to its attention.
26. The company is also modifying the door key switch on the class 317 units to remove the separate switch, so that it is only necessary to turn the key to activate the doors. It also reports that a new 'fitness for service' check has now been introduced to ensure that the TIS and other safety devices are checked before the unit is handed over for service.

Learning points

27. The RAIB has identified the following specific learning points:

For train drivers

- The importance of following the correct procedures for train preparation, and carrying them out properly.
- When taking over a train, the need to open up the cab carefully and check that everything that is done carefully and in the right order.
- At each station, the importance of being vigilant and using the correct procedure to check that the doors are closed properly and it is safe for the train to depart.
- Always wait for the train dispatch signal – do not anticipate it.

For train operating companies

- Staff who have to prepare trains may need to be regularly reminded of the importance and safety critical nature of this part of their duties. Adequate monitoring, supervision and audit of the preparation process should form part of each company's safety management system.
- There should be a robust system to ensure that trains are not handed back from the depot to operations with equipment isolated.

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