



Rail Accident Investigation Branch

Rail Accident Report



Derailment at Watford Junction Yard

28 October 2005

Department for
Transport

Report 02/2006
March 2006

This investigation was carried out in accordance with:

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

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

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Introduction

Preface

- 1 The sole purpose of a Rail Accident Investigation Branch investigation is to prevent future accidents and incidents and improve railway safety.
- 2 The Rail Accident Investigation Branch does not establish blame, liability or carry out prosecutions.
- 3 In this report certain technical terms (shown in *italics*) are explained in the Glossary at the end of the report.
- 4 This report contains the findings of the RAIB investigation into an accident on 28 October 2005 in which a train became derailed in Watford Yard.
- 5 The investigation examined the actions of the member of staff in charge of the movement and the local understanding of the *ground frame* controlling the movement.

Summary

- 6 A train formed of a 4-car class 321 *electric multiple unit*, number 321347, was derailed in the yard at Watford Junction station at approximately 05.30 hrs on 28 October 2005 when being moved as an empty non passenger carrying train across the points connecting No 1 siding to the branch line to St Albans Abbey. There were no injuries to staff and the derailment was limited to the second bogie of the second vehicle. Some damage occurred to the track which was repaired, enabling the branch to be reopened by 16.00 hrs that day.
- 7 The immediate cause was an error in the operation of the *ground frame* controlling the points causing the points to move under the train.
- 8 Contributing factors were:
 - inadequate understanding by staff of the operation and function of a related *track circuit* and the indicator light at the *ground frame*;
 - absence of suitable written instructions for the operation of the *ground frame*;
 - the absence of any locking preventing the movement of the points during the passage of a train.
- 9 Four recommendations are made to reduce the likelihood of a recurrence of this incident.

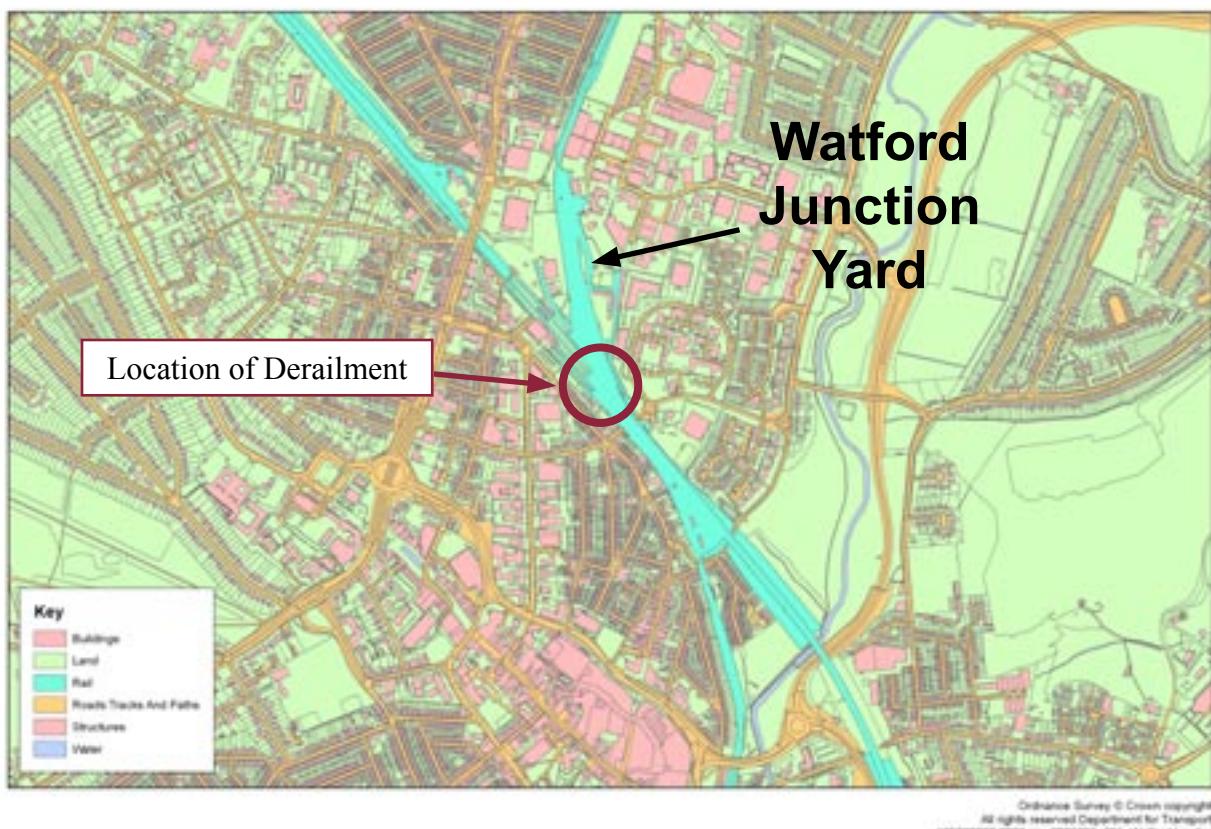


Figure 1: Extract from OS map of Watford Junction Yard and surrounding area.

The Investigation

Local situation

- 10 The Watford Junction to St Albans Abbey Branch is a single line operated on the *One Train Working* system. Services on the Branch are operated by Silverlink. The line features no turnouts, points or signals between Platform 11 at Watford Junction and the station at St Albans Abbey. A sketch of the track layout and the associated signalling at Watford is to be found at Appendix C.
- 11 Access to the St Albans Abbey Branch at Watford Junction is gained through the yard adjacent to the West Coast main line. The points giving access to the Branch are controlled by a *ground frame* which is *released* by the signaller in Watford Junction Signal Box. Entry to the yard itself is either directly from the Slow Lines or via a shunting neck.
- 12 The *ground frame* is shown in Figure 2. When it is *released* by the signaller, a white light with a black letter 'F' on a panel adjacent to the *ground frame* is illuminated. To obtain control of the *ground frame*, the operator presses a plunger when the light is illuminated and simultaneously pulls a *release* lever on the Frame. The points accessing the Branch are then under the control of the *ground frame* until the *release* lever is returned to its original position.
- 13 The yard at Watford Junction is used by English Welsh & Scottish Railway (EWS), Silverlink, Network Rail and infrastructure maintenance train operating companies (TOCs) to stable various vehicles. The *ground frame* gives access from within the yard to the Branch and is operated by the Duty Station Manager (DSM), who is a member of Silverlink's staff.

Events preceding and during the incident

- 14 On the morning of 28 October 2005 unit 321347 was to be moved as an empty unit from No. 1 siding in the yard into Platform 11 to work that day's service on the Branch at approximately 05.30 hrs. The weather was clear; although rain was falling it had no effect on the operation of the yard. Artificial lighting was adequate to give the *ground frame* operator a clear view of the movement.
- 15 The DSM spoke to the signaller at Watford Junction Signal Box via a direct telephone line from the station giving advice of the intended move. The signaller duly *released* the *ground frame* and *cleared* the position light signal WJ2002 to authorise the unit to proceed into the shunting neck. The DSM placed a hand lamp by the *ground frame* across the covers of the plunger and the 'F' light and explained the move to the driver of the unit who moved it from No. 1 siding into the neck, driving from the leading, south end cab.
- 16 Once the unit was clear of the points giving access to the Branch, the DSM pressed the *ground frame* plunger and pulled the *release* lever. The DSM then altered the setting of the points to direct the unit onto the branch line and checked that the route was correctly set.

- 17 When the driver reached the north end of the unit, the DSM confirmed that the route had been set and that the unit could be moved onto the Branch and verbally authorised the driver to do so. The DSM moved to stand in a place of safety near to the *ground frame* as the unit began the move.

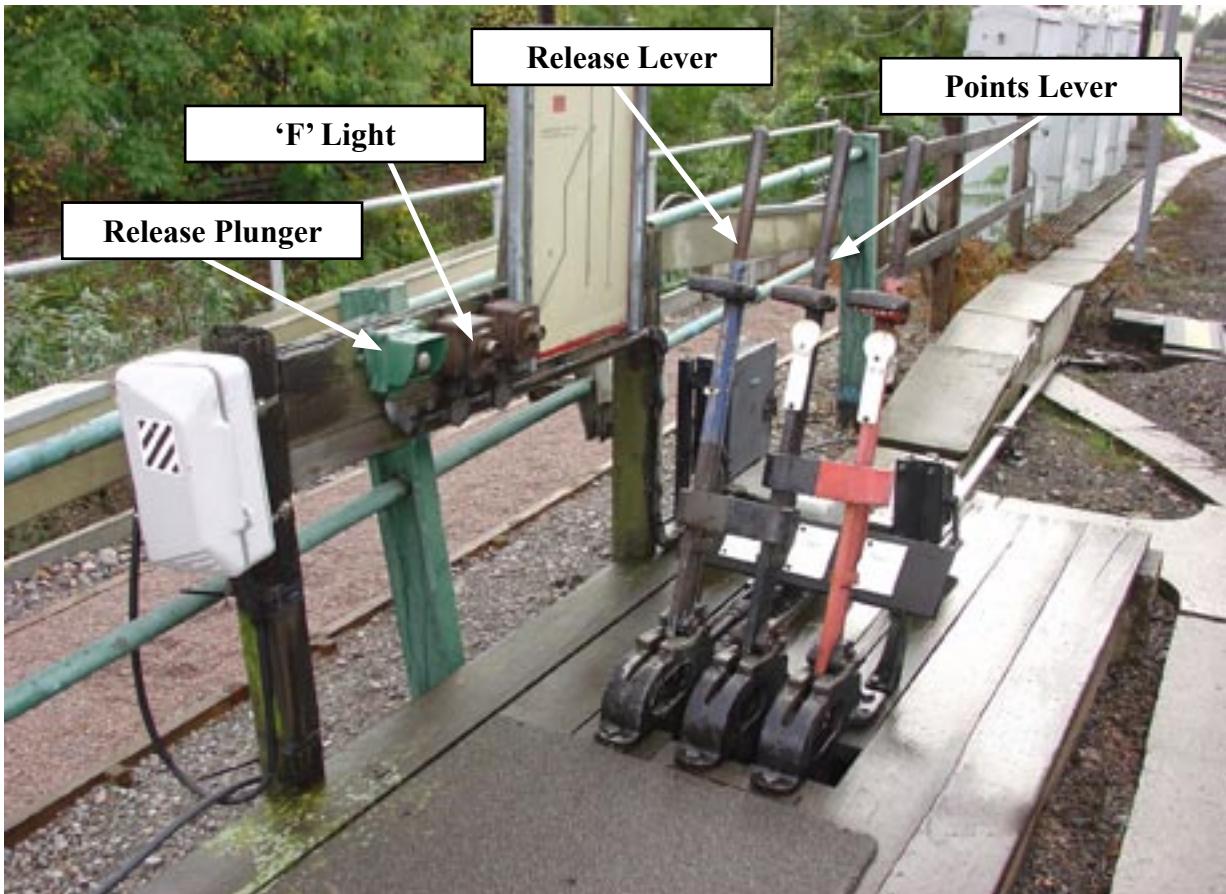


Figure 2: Watford Yard Ground Frame

- 18 The driver moved the unit onto the Branch at a speed estimated as being approximately 3 mph, the maximum permitted shunting speed being 5 mph, and, on becoming aware that the unit was not moving normally, brought the train to a stand. The speed of the movement was established from recordings made by a CCTV monitor mounted on the end of a class 313 unit berthed on the adjacent No 3 siding.
- 19 As the second vehicle of the unit passed over the points, the DSM moved the point operating lever thereby changing the points under the moving train. As a consequence the fourth and subsequent bogies of the unit were directed to No. 1 siding instead of the Branch. The fourth bogie (the trailing bogie of the second vehicle, number 63105) became derailed at the crossing of the points. The train came to rest as shown in Figure 3.



Figure 3: Immediate aftermath of the derailment

- 20 The signaller, who had become aware of the derailment by the unusual noise of the movement, prevented further train movements on both Slow Lines as a precaution and advised the driver via the Cab Secure Radio of the derailment. In fact the unit was not foul of the *Up* Slow line.
- 21 No injuries occurred. Damage was confined to lateral distortion of the track and limited damage to the derailed bogie and the bodies of the second and third vehicles.
- 22 The unit was rerailed by EWS breakdown staff and the track repaired to enable the service on the Branch to be resumed by 16.00 hrs that day. The unit was subsequently moved to Bletchley Depot for inspection and minor repairs.

Background

- 23 Since April 2005 a new group of DSMs has been appointed by Silverlink, all those previously in post being displaced due to a Silverlink reorganisation. This appointment has included training in the operation of the *ground frame* and an assessment to prove competency in its use. The training was based around learning by the example of the trainer and doing the work under close supervision prior to being assessed. It was given by the Group Station Manager. It was not formally documented and thus not in accordance with Rail Safety and Standards Board Code of Practice GO/RC3560 'Competence Assessment'. The assessment, carried out by one of the displaced DSMs, was a combination of written and practical testing, though the practical test included a verbal description of the operation of the *ground frame* rather than an actual demonstration.

- 24 The greater part of the DSM's duties involve matters of a 'retail' rather than 'operating' nature within the station. The latter include the movement of Silverlink rolling stock in and out of the yard, the operation of the *ground frame* and platform duties concerning the *up* sleeping car train from Glasgow. This train is timetabled to call at Watford soon after the stock movement to the St Albans Abbey Branch.
- 25 The only written instructions specific to the *release* of the *ground frame* that have been found were issued by Network Rail to the signallers and concerned the conditions under which it could be *released* by the signaller. No instructions have been provided by Silverlink relating to the giving up of the *release* or the indications given on the panel adjacent to the *ground frame*.
- 26 The DSM would not usually operate the *ground frame* more than once in a shift.
- 27 When a train passes onto the St Albans Abbey Branch from the shunting neck, it occupies *track circuit* ZA when the leading end has reached a position 7.4 metres from the *toe* of the points accessing the Branch (see Appendix C). Occupation of this *track circuit* removes the electrical *release* of the *ground frame* and consequently the 'F' light is extinguished. Thus, the occupation of *track circuit* ZA has exactly the same effect as the signaller removing the *release* of the *ground frame*. The purpose of this feature is to prevent the *release* of the *ground frame* when another train is standing between the points it controls and Platform 11.
- 28 When the signaller *releases* the *ground frame* by placing the switch in the signal box to 'Free' and *track circuit* ZA is not occupied, the *ground frame* operator can take control of the frame by simultaneously pressing the *release* plunger and pulling the blue *release* lever (See Figure 1).
- 29 An electrical *release* of the *ground frame* can only be obtained when both the signaller has placed the switch in the signal box to 'Free' and *track circuit* ZA is unoccupied. When an electrical *release* is given, the *release* lever is freed to operate when the plunger is simultaneously depressed.
- 30 Once the *release* lever on the *ground frame* has been pulled, the associated lever which controls the movement of the points is free to operate until the *release* lever has been returned to its original position, regardless of the state of *track circuit* ZA, the position of the signaller's switch or the state of the 'F' light.
- 31 Since 1992, there has been no previous derailment at this location. RAIB has not looked for incidents any further back than this.

Analysis

- 32 The DSM involved in the incident was appointed to the post in April 2005 having entered railway employment in May 2000. As indicated at paragraph 23, records state that the DSM has been trained and evidence has been provided to indicate a good performance during the assessment. The DSM took up these duties in June 2005 and would generally operate the *ground frame* once at least every other day they work.
- 33 Silverlink staff responsible for the training and competency assessment of *ground frame* operators believed that, unless some defect occurred, the only circumstance under which the 'F' light could go out was when the signaller removed the *release* from the *ground frame*. Witness interviews show that there is a general belief amongst Silverlink staff that some signallers remove the *release* before the *ground frame* operator has given it up and that this is apparent to the operator by observing the 'F' light as being extinguished. Although theoretically possible, it is clear that on this occasion the signaller did not remove the *release*.
- 34 In reality, as indicated in paragraphs 27, 28 and 29, the 'F' light is also extinguished by the occupation of ZA *track circuit*. It is likely that this was observed by Silverlink staff who assumed, wrongly, that it indicated the removal of the *release* by the signaller. This was certainly the situation in the case of at least one witness. Recommendations 1 & 2 refer.
- 35 It was not possible to establish why the DSM changed the points whilst the train was still moving across them. The DSM was aware of looking at the hand lamp (paragraph 15) and making the mental note that it would be needed for the next duty of dealing with the Glasgow sleeper (paragraph 24). At that moment the DSM also noticed that the 'F' light had gone out and shortly afterwards pulled the points operating lever. It is probable that the DSM understood the extinguishing of the 'F' light to mean that the signaller had removed the *release*.
- 36 However, it is likely that the 'F' light being extinguished triggered an association with the movement onto the St Albans Abbey Branch being completed. The final action of duties at the *ground frame* before giving up the *release* to the signaller is to return the points and the *release* lever to their normal positions. Recommendations 1 & 2 refer.
- 37 Had the DSM been prevented from moving the points while a train was passing over them, either by being unable to reach the point lever, or because it was locked, or by some other means, the derailment would not have occurred. Recommendation 2 refers.
- 38 Overall responsibility for infrastructure and associated instructions rests with Network Rail. Recommendations 3 & 4 refer.

Conclusions

- 39 The immediate cause of the derailment was the operation of the points under the second vehicle of the train by the DSM.
- 40 A causal factor was the lack of understanding by Silverlink staff at Watford of the operation and function of *track circuit ZA* and the indicator light at the *ground frame*.
- 41 Contributory factors were:
 - the absence of suitable written instructions for the operation of the *ground frame* contributed to the lack of understanding;
 - the absence of any locking preventing the movement of the points during the passage of a train.

Action already taken or in progress

- 42 An investigation into the cause of the derailment has been carried out by Silverlink and Network Rail.
- 43 Following this investigation, Silverlink has reviewed its Competence Management System and is progressing arrangements towards transferring responsibility for assessment of DSMs from the Group Station Managers to the Conductor Managers, who are part of the Operations Team at Watford.
- 44 All DSMs have been briefed in the operation of the *ground frame*.
- 45 The DSM involved has been retrained and reassessed as competent.

Recommendations

46 Implementation of the recommendations below is the responsibility of the organisations identified in each one. When they have considered the recommendations, the organisations should establish a priority and timescale for the necessary work, taking into account their health and safety responsibilities and the risk profile of their activities.

- 1 The Silverlink management should take immediate steps to ensure that personnel managing and operating Watford Yard *ground frame* are fully aware of the presence, purpose and effect of the indicator light and *track circuit ZA* (paragraphs 34 & 36)
- 2 Silverlink should issue instructions immediately that operators stand away from Watford Yard *ground frame* and observe the completion of a movement over the points before returning to the *ground frame* to move the points or give up the *release* (paragraphs 34, 36 & 37)
- 3 As soon as practical Network Rail should issue written instructions for the operation of Watford Yard *ground frame* in conjunction with the appropriate TOCs, who should specify and implement competency assessment applicable to all staff involved with operation of the *ground frame* (paragraph 38)
- 4 In the longer term, consideration should be given by Network Rail to the provision of a locking arrangement on the Watford Yard *ground frame* points when any alterations are made to the yard or the signalling in the Watford area (paragraph 38)

Appendices

Glossary of terms

Appendix A

These items are shown *italicised* when they appear in the text.

Clear	The action of clearing a signal – placing it the ‘clear’ position – is to cause its indication to permit a train to pass it.
Electric Multiple Unit	An electric train comprising a number of passenger carriages semi-permanently coupled together with a driving cab at each end.
Ground Frame	A local control facility for operating points.
One Train Working	A system of train working whereby one train is isolated on a section of line from the rest of the network and permitted to operate on that line without reference to signallers.
Release	For a ground frame to be operated the signaller in the local signal box has to ‘release’ the frame, usually by operating a switch on the signalling control panel. Until the ‘release’ is given, the levers in the frame remained locked.
Toe	The swinging end of a point rail.
Track Circuit	An item of electrical signalling equipment connected to the rails to detect the presence of a train.
Up	Track or train with direction of travel towards London (in this case).

Glossary of abbreviations and acronyms

Appendix B

CCTV

Closed-Circuit Television

DSM

Duty Station Manager

EWS

English Welsh & Scottish

TOC

Train Operating Company

Appendix C

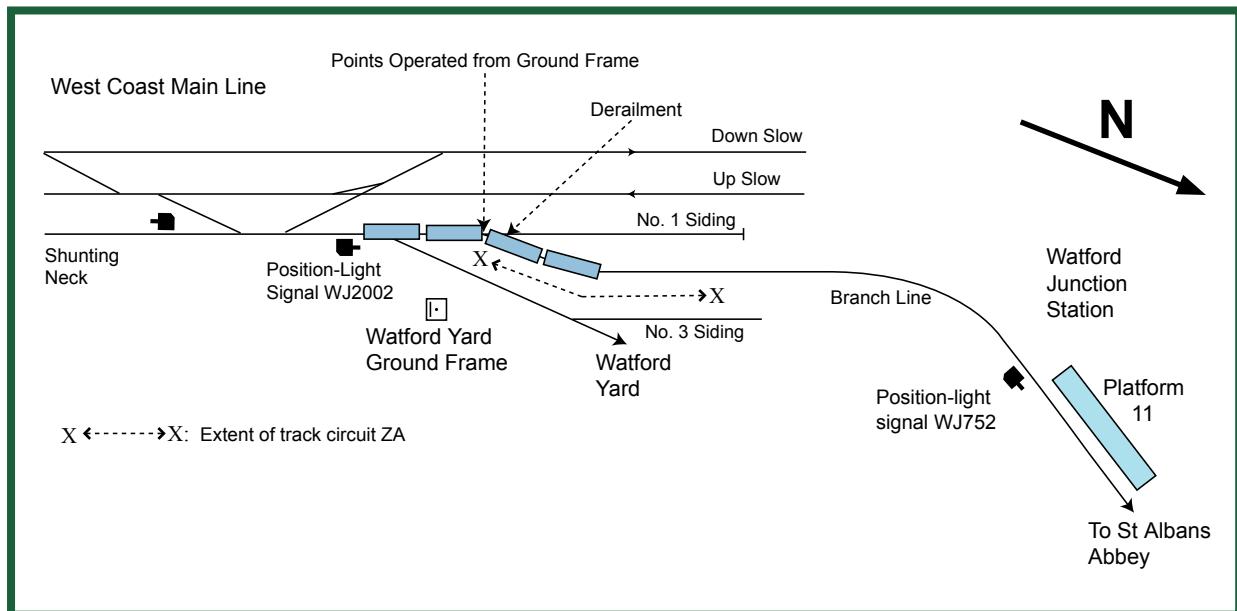


Figure 4: Track layout and associated signalling adjacent to Watford Yard Ground Frame

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