



Rail Accident Investigation Branch

Rail Accident Report



**Two trains in the same section at Aylesbury
27 August 2007**

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.

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

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Introduction

- 1 The sole purpose of a Rail Accident Investigation Branch (RAIB) investigation is to prevent future accidents and incidents and improve railway safety.
- 2 The RAIB does not establish blame, liability or carry out prosecutions.
- 3 Access was freely given by Chiltern Railway Company, English Welsh and Scottish Railway (EWS) and Network Rail to their staff, data and records in connection with the investigation.
- 4 Appendices at the rear of this report contain the following glossaries:
 - acronyms and abbreviations are explained in Appendix A;
 - technical terms (shown in *italics* the first time they appear in the report) are explained in Appendix B; and
 - A description of the method of operation of single lines by the *electric token block* system is given in Appendix C.

The Incident

Summary of the incident

- An operating irregularity occurred at 10:38 hrs on 27 August 2007 on the single line between Aylesbury and Claydon L&NE Junction (Figure 1). A passenger train ran onto a section of line already occupied by a locomotive which was part way through making a *run-round* move.

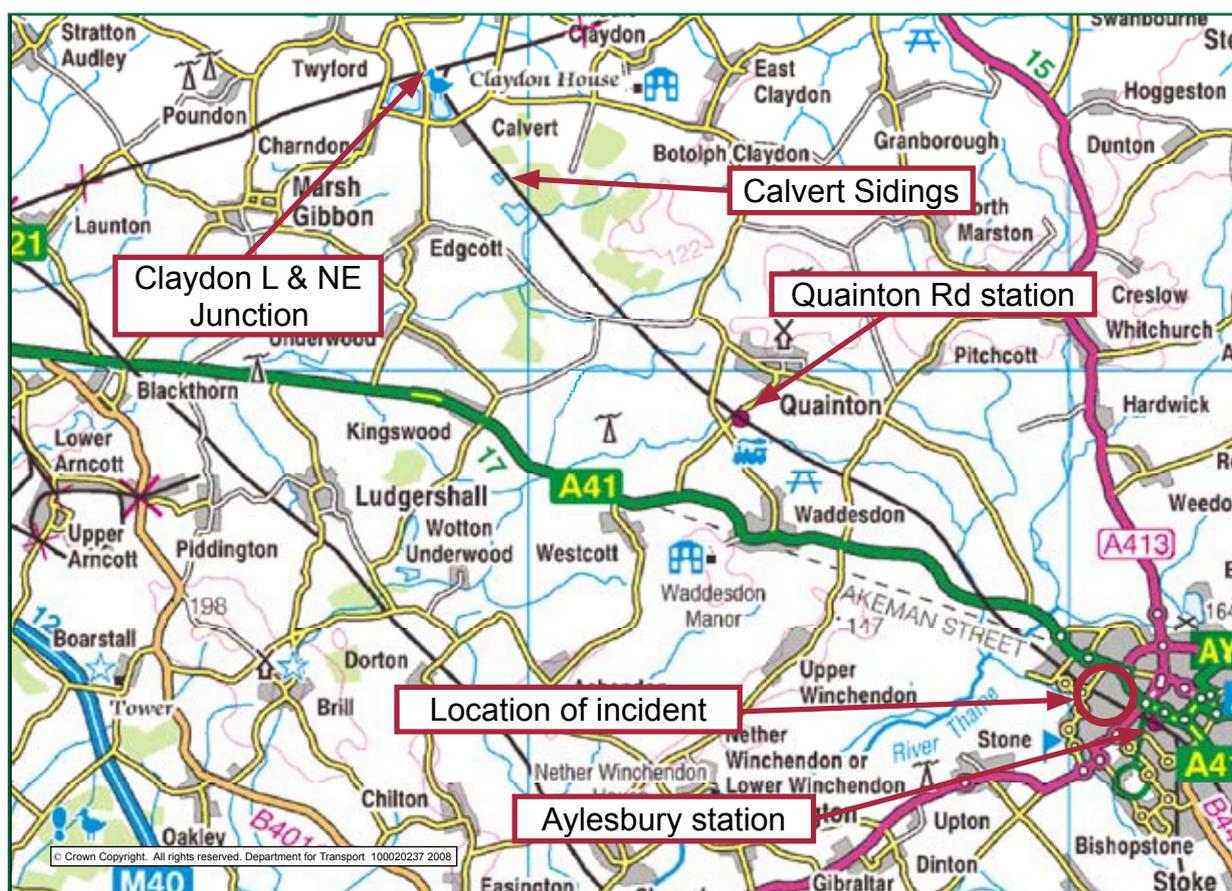


Figure 1: Ordnance survey map of the area

- Train 6P27, an infrastructure train, was scheduled to run from Aylesbury North loop to Oxford, Hinksey yard. Before the train could leave the loop, the locomotive, which was at the north end of the train, had to run round to the south (Aylesbury) end of the train.

7 The train crew consisted of a driver and a shunter. The shunter obtained a *single line token* from the *token machine* at Aylesbury North *ground frame* (Figures 2 and 3), used it to unlock the ground frame, reversed the points and called the locomotive from the loop onto the running line. The shunter then returned the points to the normal position and returned the token to the token machine.

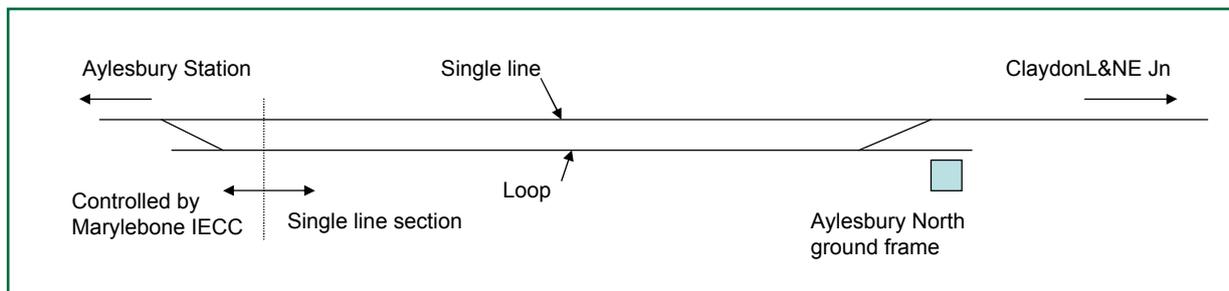


Figure 2: Schematic plan of the Aylesbury north loop



Figure 3: Aylesbury north ground frame

8 The single line north of Aylesbury is normally only used by freight trains but special passenger trains were being operated on 27 August 2007 between Aylesbury and Quainton Road to convey visitors to the Buckinghamshire Railway Centre. The passenger train service, reporting number 1T80, consisted of a single car class 121 diesel multiple unit.

- 9 Train 1T80 was late departing Aylesbury due to difficulties in obtaining the single line token. The signaller at Marylebone Integrated Electronic Control Centre (IECC) issued the token to the driver of 1T80 at 10:34 hrs and cleared the signal protecting access onto the single line; the train departed from Aylesbury at 10:36 hrs, 26 minutes late.
- 10 Train 1T80 ran onto the single line and, as it rounded a curve, the driver saw the locomotive from train 6P27 standing on the single line ahead of him. He immediately stopped the train and made an emergency call to Marylebone IECC at 10:38 hrs. The signaller instructed the driver to return his train to Aylesbury station and detrain the passengers.
- 11 Train 1T80 had stopped approximately 500 m away from the locomotive of train 6P27 (Figure 4).



Figure 4: View from the front of train 1T80, showing locomotive 59102 in the distance and vehicles of train 6P27 on the right (photograph courtesy of David Paylor)

The parties involved

- 12 Train 6P27 was operated by EWS and was crewed by a driver and a member of *ground staff* acting as shunter. Both members of staff were employed by EWS.
- 13 Train 1T80 was operated and staffed by Chiltern Railway Company. The crew comprised a driver and guard.
- 14 The line is owned and operated by Network Rail and is part of their London & North West Territory.

Location

- 15 Aylesbury station used to be an intermediate station on the Metropolitan Railway line to Quainton Road and Verney Junction. The Great Central (GC) main line joined this line at Quainton Road. After closure of most of the GC main line in 1969, Aylesbury station became the terminus for a suburban service from London Marylebone. The line between Marylebone and Aylesbury was resignalled in the 1980s and brought under the control of Marylebone IECC.
- 16 North of Aylesbury a single line was retained to Claydon L&NE Junction, on the Oxford – Bletchley line. This line provides access to freight sidings at Calvert and to Quainton Road station for the Buckinghamshire Railway Centre, a railway heritage centre.
- 17 The Marylebone IECC control area extends to milepost 38 ½ (measured from Baker Street), a point north of Aylesbury station where there is a single running line and a goods loop, Aylesbury North loop (Figure 2). The crossover at the Aylesbury end of the loop is controlled from Marylebone IECC. The crossover at the north end of the loop is controlled from a ground frame at Aylesbury North.
- 18 The single line between Aylesbury and Claydon L&NE Junction is operated by the electric token block system. There are token instruments at each end of the single line, at Aylesbury station and at Claydon L&NE Junction signal box. There are also intermediate token instruments at Aylesbury North ground frame and at the Waste Recycling Group private siding at Calvert.
- 19 The token instrument at Aylesbury is located in the train crew supervisor's office (Figure 5). The release of tokens is controlled by Marylebone IECC and Claydon L&NE Junction signallers. The signallers both have to operate a token release control at the same time to release the token instruments.



Figure 5: Token instrument at Aylesbury traincrew supervisor's office

- 20 There is one intermediate station between Aylesbury and Claydon L&NE Junction, at Quanton Road. This station is adjacent to the Buckinghamshire Railway Centre and is only used by passenger trains on an occasional basis to provide access to the centre.
- 21 The linespeed on the single line is generally 30 mph (48 km/h) but is reduced to 15 mph (24 km/h) between Calvert and Claydon L&NE Junction. The speed through the crossovers into Aylesbury North loop is 15 mph (24 km/h). The passenger train, 1T80, was restricted by a *special train notice* to a maximum speed of 20 mph (32 km/h).

External circumstances

- 22 Monday 27 August 2007 was a Bank Holiday and a special passenger train shuttle was being operated between Aylesbury and Quanton Road in connection with the Buckinghamshire Railway Centre. Train 1T80 was due to depart from Aylesbury at 10:10 hrs but was delayed by difficulties in obtaining the single line token.
- 23 Train 6P27 had been stabled in Aylesbury North loop after returning from engineering work the previous night. A train crew was sent by taxi from Acton to take the train from Aylesbury to Oxford. As the locomotive was at the north end of the train and therefore the wrong end for departure via the booked route, it had to run round the train before departure.
- 24 The weather at the time was sunny and dry. Weather conditions did not contribute to this incident.

Train(s)/rail equipment

- 25 Train 6P27 consisted (from the north end) of a class 59 locomotive, no. 59 102, two wagons loaded with concrete sleepers and 17 empty wagons.
- 26 Train 1T80 consisted of a single car diesel multiple unit, no. 121 020, a diesel mechanical unit built in 1960.
- 27 The electric token block system normally consists of a token machine in the signal box at each end of the single line. The machines are electrically linked so that only one token can be out of a machine at one time. A 'generic' description of how an electric token block single line is operated is given in Appendix C.
- 28 The token block system between Aylesbury and Claydon L&NE junction is slightly more complex than the simple system described in Appendix C. There is no signal box at the Aylesbury end of the single line, as the Aylesbury end is signalled from Marylebone IECC, 38 miles (61 km) away. The token machine is instead situated in the train crew supervisor's office at Aylesbury with the token release switch being operated remotely from Marylebone IECC.
- 29 A further complication arises as there are sidings off the single line where a train can be stabled clear of the line. A train running into one of these sidings needs to be able to return the token in order to release the token machines for other trains to pass. There are two such locations on the Aylesbury to Claydon L&NE Junction line, at Aylesbury North loop and at Calvert. At each of these intermediate locations, an additional token machine is provided. These intermediate locations do not have token release switches but have indicators on the machines to show when the machine is unlocked for token issue.



Figure 6: Token being taken from the machine

- 30 The release switch that the signallers operate to issue a token releases all of the token machines; at Aylesbury station, Aylesbury North groundframe, Calvert sidings and Claydon L&NE Junction. When the signallers at Marylebone and Claydon L&NE Junction have operated their release controls, a token can be withdrawn from any one of the four machines. All of the machines are fitted with indicator needles to show when the release has been given.

Events preceding the incident

- 31 The driver for train 6P27 started work at 07:35 hrs at Acton Yard. The shunter was based at Acton Yard and started work there at 06:00 hrs then travelled with the driver by taxi to Aylesbury to pick up the train. On arrival, the shunter went to the train crew supervisor's office to obtain a single line token but was told by the supervisor to obtain one from the instrument at Aylesbury North ground frame.
- 32 The driver and shunter then walked to their train at Aylesbury North. The shunter secured the wagons and uncoupled the locomotive. The shunter then unlocked the token instrument box at Aylesbury North ground frame and used a mobile phone to contact the signaller at Marylebone IECC to ask for a token release. This call was made at 10:04 hrs.

- 33 The signaller at Marylebone IECC was unsure whether to allow the locomotive run round or the departure of the passenger train 1T80 first, so he asked the shunter to wait while he contacted the controller in the Network Rail control office at Birmingham for advice. The phone call was ended and the shunter waited by the token instrument.
- 34 The controller was dealing with another matter and it was some time before the signaller was able to speak to him. As the departure time for 1T80 had now passed, the controller told the signaller to run 1T80 before the run round movement.

Events during the incident

- 35 The signaller at Marylebone IECC contacted the signaller at Claydon L&NE Junction to ask for the token release and then both of them operated the token release controls.
- 36 The shunter at Aylesbury North saw the indicator needle on the token instrument move to the release position and assumed that the token release was for his train. He withdrew a token, unlocked the ground frame and authorised the driver of 6P27 to commence the run round move.
- 37 The driver of 6P27 moved his locomotive out of the loop onto the single line.
- 38 Meanwhile, the driver of 1T80 tried to get a token from the machine at Aylesbury station but was unable to do so as the machine was now locked, a token having been taken from the Aylesbury North ground frame machine. The train crew supervisor at Aylesbury spoke to the signaller at Marylebone IECC by phone and the signaller tried again to give the release, but was unable to do so.
- 39 The signaller phoned the shunter at Aylesbury North and asked whether he had taken a token out. When the shunter said that he had, the signaller reprimanded him for taking it without permission. The shunter told the signaller that he had understood the movement of the indicator needle to mean that the signaller was giving him permission to take a token. The signaller and shunter did not reach an understanding as to the whereabouts of the locomotive as the position of the locomotive was not mentioned in the conversation. The signaller did not instruct the shunter to return the token to the token instrument. The signaller did not give the shunter a clear statement of what he was going to do next.
- 40 The shunter locked the ground frame with the crossover points set to the *normal position*, ie for the main line. The token can only be removed from the lock on the ground frame when the points are in the normal position. The shunter then removed the token from the ground frame lock and returned it to the token instrument. Figure 7 shows the ground frame and token instrument.
- 41 While the shunting move was taking place, the signaller phoned the Birmingham control office to report the token irregularity. The controller advised that, since the crew of 6P27 had the token, they may as well finish the run round move. The controller arranged for a Network Rail *mobile operations manager* to attend the site to investigate the token irregularity.
- 42 During this time a telephone conversation took place between the shunter and another person in the IECC. During this call the person in the IECC recorded the phone number of the shunter and said that the signaller would call him back.



Figure 7: Ground frame and token instrument at Aylesbury north

- 43 The driver of the locomotive from train 6P27 changed ends while the locomotive was standing on the single line ready to run round his train. The driver phoned the signaller to request confirmation that he had authority to proceed. The signaller asked the driver to confirm that he was in possession of the token. The driver passed the phone to the shunter to answer. The shunter said that he had returned the token to the machine. This conversation involved the driver, signaller and shunter. At no point did any of them mention that the locomotive was no longer in the loop. The driver did not mention that his locomotive was standing on the single line without a token.
- 44 The signaller told the shunter to remain where he was and not to take any further tokens. The signaller did not establish whether the locomotive was standing on the single line and assumed that it was still in the loop.
- 45 As the token was now back in the machine, the signaller, in cooperation with the signaller at Claydon L&NE Junction, was able to successfully give a release to the instrument in Aylesbury train crew supervisor's office. A token was withdrawn from this machine for train 1T80 at 10:34 hrs and given to the driver.
- 46 Having issued a token from the machine at Aylesbury station, the signaller at Marylebone IECC was able to clear the signal for the single line, which he did, and train 1T80 departed 26 minutes late.
- 47 The train rounded a curve in the track and the locomotive from train 6P27 came into view. The driver stopped immediately and made an emergency call to Marylebone IECC.
- 48 The driver and shunter of train 6P27 saw the approaching passenger train and displayed a red flag. No other means of protecting the line in an emergency (eg detonators) was deployed.

Consequences of the incident

- 49 The passenger train and locomotive were more than 500 m apart when the passenger train stopped. The locomotive was stationary at the time the passenger train stopped. The visibility was clear (Figure 4).
- 50 In this instance, the two trains did not collide and nobody was injured. However, in other circumstances the consequences could have been more severe.

Events following the incident

- 51 Network Rail control was advised of the incident and the mobile operations manager was given the details. The mobile operations manager was already on his way to Aylesbury in response to the token irregularity.
- 52 After speaking to operations control, the signaller at Marylebone IECC instructed the driver of train 1T80 to *change ends* and return to Aylesbury station, where the passengers were detrained and the train cancelled. The token was returned to the token machine at Aylesbury station.
- 53 The mobile operations manager took charge of all of the token machines at the Aylesbury end of the line and the signallers at Marylebone and Claydon L&NE Junction operated the release to allow the mobile operations manager to obtain a token.
- 54 The mobile operations manager took the token from the machine at Aylesbury North and supervised the return of the locomotive to the loop. He then returned the token to the machine at Aylesbury North at 11:32 hrs.

The Investigation

Sources of evidence

- 55 Information was obtained from the following sources:
- EWS and Network Rail investigation reports;
 - statements by Network Rail and EWS staff;
 - telephone voice recordings from Marylebone IECC;
 - photographs taken from train 1T80 by a passenger on that train;
 - photographs and information gathered by the RAIB; and
 - information on previous similar incidents supplied by RSSB, Freightliner and Network Rail.
- 56 The shunter and the signaller at Marylebone IECC were tested for drugs and alcohol following the incident in accordance with normal industry practice and the tests showed that none was present.

Factual Information

Operating instructions

- 57 The operation of single lines by the electric token system is covered by the Railway Rule Book, GE/RT8000, modules TS4 (for signallers) and TW6 (for drivers). These rules state that only one train shall be in the single line section at a time and that that train must be in possession of a token. Module TW6 tells the driver that he must only receive and return tokens from/to the signaller or a person authorised in the *sectional appendix* (paragraph 58). If the train needs to carry out shunting duties in the single line section, and the token is needed to unlock the ground frame, the driver is told to give the token to the shunter for this purpose. The train must not continue its journey until the points have been returned to the correct position for trains to pass, the ground frame locked and the token returned to the driver. Neither of the rule book modules TS4 and TW6 are issued to shunters. Instead, shunters are issued with rule book module SS2 which contains the instructions from TW6 relevant to shunters operating a ground frame. The instructions tell the shunter that they should get the token from the driver and return it to him after the shunt move is complete. The instruction in TW6 that tells the driver to inform the signaller and keep the token if any part of the train is left on the single line is not mentioned in module SS2.
- 58 The single line between Aylesbury and Claydon L&NE Junction has local operating instructions given in the sectional appendix under the route 'MD725 – Aylesbury to Claydon L&NE Junction'. These instructions are dated 26/5/07 and have the heading 'Waste Recycling Group Private Siding'. The instructions describe how a train arriving or departing from the sidings (which are at Calvert) is to be signalled. They state that 'an intermediate key token instrument is provided in the mess room of Waste Recycling Group' and tell the train crew and signallers what to do regarding the issuing of tokens and liaison with the person in charge at the sidings.
- 59 The instructions in the sectional appendix do not mention the token instrument at Aylesbury North ground frame or give any instructions on how to operate trains at that location.
- 60 The relevant sectional appendix 'line of route description' page, in the 'signalling and remarks' column states that the station supervisor at Aylesbury is authorised to receive or deliver the token.

The staff involved

- 61 The driver of train 6P27, whose locomotive was on the single line when the passenger train approached, started working for EWS as a trainee on 12 March 2001 and qualified as a driver on 24 February 2002. EWS monitor the performance of their employees by means of an employee performance profile (EPP). This includes an element which assesses the risk to them from external circumstances, for example personal problems outside of work. The driver's EPP rating was low risk.

- 62 The shunter started work as a shunter with British Rail (BR) on 29 November 1982 and had worked as a shunter for EWS since privatisation of the BR freight companies in 1996. He was based at Acton Yard and worked at various locations in the London area. The shunter had been certified on the Calvert location on 8 Feb 1999 and recertified on 13 February 2007. He had never worked the ground frame at Aylesbury North before. The rostering process used by EWS at Acton to assign ground staff to duties did not take account of the experience of the staff of working that location. The shunter's EPP rating was low risk.
- 63 The signaller started work for Network Rail as a signaller on 27 September 2004 at Neasden Junction signal box. He started working at Marylebone IECC on 16 January 2006.
- 64 On the day of the incident the signaller booked on at 07:00 hrs. The signaller had worked a 12 hour day shift (07:00 hrs to 19:00 hrs) the day before the incident and had two rest days on the days before that. During the previous week he had worked a 12 hour day shift followed by 24 hours break then three 12 hour night shifts. Network Rail calculated the risk index element of the *fatigue and risk index* for the signaller to be an average of 1.04 with a peak of 1.28. These values indicate that the risk of fatigue was slightly more than the average of 1.0.
- 65 The driver had been working early turn shifts for the eight days up to and including the day of the incident. His booking on times for these shifts varied between 03:31 hrs and 07:35 hrs and the shift durations were between 5 hrs 36 mins and 12 hrs. On the day of the incident the driver booked on at 07:35 hrs. The driver's risk index was calculated at a maximum value of 1.12. This value is slightly above the average level of fatigue risk.
- 66 The shunter had worked mainly day shifts but with one early turn in the week preceding the incident. These shifts started at 10:00 hrs (day shifts) and 05:00 hrs (early shift) and had durations of between 6 hrs and 11 hrs 30 mins. He then had two rest days and signed on on the day of the incident at 06:00 hrs. The fatigue risk for this shift pattern, on the day of incident, was 0.94. This value is below the average level of 1.0.
- 67 Fatigue is not considered to be a causal or contributory factor in this incident.

Training

- 68 EWS drivers and ground staff (shunters) are given training on token working arrangements during their basic training. After they have completed their basic training they are subject to an ongoing assessment regime. This includes summary assessments over a two yearly cycle with four assessments within the cycle. The cycle includes both theoretical and practical assessments. The summary assessments and practical assessments do not include token working arrangements. The only time token working would be examined would be as part of the route learning examination for an area which included token working.
- 69 The driver *signed for* the Aylesbury to Claydon L&NE Junction route on 29 July 2002 and had been regularly rostered to work the route since that time. EWS manage the rostering of drivers to routes using a system which involves risk assessing each route and assigning a high, medium or low risk to it. The risk rating determines how frequently a driver must go over that route in order to retain his route knowledge. High risk routes must be rostered at intervals not exceeding 13 weeks, medium risk routes 26 weeks and low risk routes 52 weeks. Aylesbury to Claydon L&NE Junction was assessed as a low risk route. In addition to the rostering system, if a driver feels that his knowledge of a particular route requires refreshing he can request this. The driver had not requested a refresher of the Aylesbury to Claydon L&NE Junction route.

- 70 The driver's last summary assessment was on 19 February 2007 and no issues were identified. He was given a practical assessment on 10 August 2007 and no relevant issues were identified.
- 71 The shunter received a summary assessment on 9 July 2006 with no issues identified and his last practical assessment was on 26 April 2007, with no issues identified.

Previous occurrences of a similar character

- 72 Three previous incidents involving irregularities in the issue and use of tokens have occurred at this location between 2003 and 2007. One, on 2 May 2007, was very similar to the incident on 27 August 2007.
- 73 On 3 June 2003 train 6L81, the 21:43 hrs freight train from Calvert sidings to Dagenham, obtained a token from the instrument at Calvert with the permission of the signaller at Claydon L&NE Junction. The signaller gave permission for the token to be removed for a run round move and asked for it to be returned to the machine when this was done. The train crew did not return the token and continued with the train to Aylesbury, returning the token to the train crew supervisor there at 20:10 hrs. This resulted in the signaller at Claydon L&NE Junction being unaware of the train's departure. By the time the problem was realised, the train had left Aylesbury.
- 74 On 9 January 2006 at 20:55 hrs train 6L81, a freight train from Calvert sidings to Dagenham, obtained a token from the intermediate token machine at Calvert sidings. The token was used to unlock the ground frame at Calvert sidings while the train was being prepared for departure. When the train was ready, it departed onto the single line to Aylesbury without the token, which was left in the ground frame, which itself was left unlocked. The signaller at Claydon L&NE Junction noticed that the train had left without locking the ground frame and the train was stopped at Aylesbury.
- 75 On 2 May 2007 at 20:47 hrs train 6L81, a freight train from Calvert sidings to Dagenham, arrived at Aylesbury North ground frame with the intention of going into the loop. The shunter alighted from the train with the token but, instead of using it to unlock the ground frame, replaced it in the token machine while the train was still on the single line. The shunter was therefore unable to unlock the ground frame and operate the points. The signaller at Marylebone IECC was contacted and the signaller operated the token release to allow the token at Aylesbury North to be taken back out of the machine to unlock the ground frame. At the same time train 6A55, a freight train from Northolt to Calvert sidings, arrived at Aylesbury. The train crew supervisor at Aylesbury station saw the token release indicator on the instrument in his office and assumed it was for train 6A55, so took out a token to give to the driver of that train without first speaking to the signaller. Train 6A55 did not depart onto the single line as the signaller at Marylebone did not clear the signal. Instead, the signaller arranged for the token to be replaced and a token issued from Aylesbury North ground frame to allow train 6L81 to enter the loop.
- 76 Following the incident on 2 May 2007, action plans were completed involving re-briefing of the staff involved. These staff were from Freightliner Heavy Haul, the operators of the train involved, and Chiltern Railways. One of the actions was that Freightliner Heavy Haul elected to re-brief their shunters on token machine operation and include it in the biennial rules examinations. This action was implemented in June 2007. The action plans did not include EWS or any other freight operators. The fact that the information was not disseminated to the other operators who use this line is considered contributory to this incident.

Analysis

Identification of the immediate cause

- 77 According to the rule book, the driver is responsible for the token however, in module TW6, the rule book allows the shunter to remove the token from the locomotive if it is required to unlock the ground frame. When shunting is complete the ground frame must be locked and the token returned to the driver. In this case, the shunter correctly locked the ground frame after moving the locomotive onto the main line but, incorrectly, then returned the token to the token machine.
- 78 The immediate cause of the incident was that the single line token was replaced in the token machine at Aylesbury North ground frame while the locomotive was standing on the single line.

Identification of causal and contributory factors

Shunter's actions

- 79 The shunter asked the signaller for a token when he first arrived at Aylesbury North. The signaller wanted to speak to Birmingham control office first and told the shunter to wait for further instructions. The shunter took the movement of the indicator on the token machine to mean that he could remove a token and did not speak to the signaller. The inability of the signalling equipment to allow the release of just one token machine is a contributory factor to this incident, but is inherent in the fundamental design of the system. There are very few places on Network Rail's system where intermediate token machines are used, and they are on very lightly-used lines. The RAIB does not consider it reasonably practicable to modify the design of the system to address this factor, and makes no recommendation about it.
- 80 When the shunt move of the locomotive from the loop onto the single line had been completed, the shunter locked the ground frame and was then phoned by the signaller. The signaller asked if the shunter had taken a token and, when the shunter told the signaller that he had done so, the signaller did not establish the whereabouts of the locomotive. The Network Rail safety-critical communications protocol requires that the signaller leads the conversation in cases such as this.
- 81 Analysis of the recordings of the phone conversations during the incident show that the shunter, during his conversations with the signaller, did not correctly follow the Network Rail safety-critical communications protocol. Poor safety-critical communications was a contributory factor in this incident and is discussed in paragraphs 86 to 88.
- 82 The shunter's lack of experience with Aylesbury North ground frame and the lack of recognition of this in the rostering process were contributory factors in the incident.

Signaller's actions

- 83 The signaller, having told the shunter at 10:04 hrs that he would get back to him, did not do so and got involved with preparations for train 1T80's departure. It is possible that the signaller had forgotten about the request from the shunter for a token; there was nothing to remind him of the shunter's request.
- 84 The signaller has lead responsibility in the safety-critical communications between signaller and shunter, which were inadequate in that a clear understanding was not reached between the two parties. This is discussed further in paragraphs 86 to 88.

Freight train driver's actions

- 85 The driver called the signaller as he was changing ends but did not tell the signaller that his locomotive was on the single line without a token. Rule Book module TW6 requires that the driver tells the signaller if any part of his train is left on the single line. The lack of clarity in the phone conversation with the signaller was contributory to this incident.

Safety-critical communications

- 86 Rule book section G1.11 defines the concept of lead responsibility in a conversation. The person with lead responsibility must ensure that all of the important information has been gathered from the other party. The person with lead responsibility is required to repeat back key information and actions to be carried out. In the case of conversations involving signallers, the lead responsibility is defined to be with the signaller. Rule book section G1.11 also mandates the use of the phonetic alphabet.
- 87 The signaller at Marylebone IECC used the phonetic alphabet but the shunter did not, until he was prompted by the signaller. The communications between shunter and signaller, in which the signaller lead, did not follow the principles of rule book section G1.11 apart from the use of the phonetic alphabet. The signaller did not ensure that the important information was obtained from the shunter, in particular the whereabouts of the locomotive.
- 88 The poor safety-critical communications, led by the signaller, are a contributory factor in this incident.

Operating instructions

- 89 The freight operating companies which use Calvert sidings have methods of working which describe to the staff involved how to operate their trains in and out of the site safely. The RAIB obtained copies of the current method of working documents for EWS and Freightliner Heavy Haul for Calvert sidings. Both documents are similar and state that the shunter should obtain the token from the machine and return it after the shunting is complete. The rule book states that only the signaller or a person authorised in the sectional appendix should receive or deliver the token to the driver. The sectional appendix does not authorise the shunter to do this, only the station supervisor. The conflict between local instructions, the rule book and sectional appendix is a contributory factor.
- 90 The Freightliner instructions contains a warning to staff not to return the token to the machine before the train has cleared the single line. This warning was in the version of the instructions current at the time of the incident on 2 May 2007, which involved a Freightliner train (paragraph 76). Following the incident on 2 May 2007 Freightliner re-briefed their shunters on these instructions and added token machine working to the biennial rules examination process.

- 91 The lack of re-examination of token working knowledge in the summary assessment process for drivers and ground staff employed by EWS is a contributory factor in this incident.
- 92 The findings of the investigation into the operating incident on 2 May 2007, which was led by Network Rail and included Freightliner Heavy Haul and Chiltern Railways, were not circulated to train operators not directly involved in the incident. Urgent advice of operating problems is dealt with by the national incident report (NIR) system, described in Group Standard GO/RT3350. This covers urgent issues that arise locally and have national implications. The local investigation into this incident considered the problem to be purely local and did not issue an NIR. There appears to be no industry-wide means of circulating such information. The lack of dissemination of this information to other operators who use this line is a contributory factor in this incident.

Severity of consequences

- 93 The weather was fine and sunny with clear conditions at the time of the incident and the low linespeed enabled the driver of 1T80 to see the locomotive ahead of him in plenty of time. He was able to stop his train with little risk of collision. However, in other circumstances the consequences could have been more severe.

Conclusions

Immediate cause

94 The immediate cause of the incident was that the shunter returned the single line token to the token machine while the locomotive was still on the single line (paragraph 78).

Causal factors

95 The shunter and the signaller at Marylebone IECC did not reach a clear understanding of the location of the locomotive when the token was returned to the machine at Aylesbury North (paragraph 80).

Contributory factors

- 96 The following factors were considered to be contributory:
- a. the EWS rostering procedure used at Acton did not recognise the shunter's lack of experience with Aylesbury North ground frame (paragraph 82);
 - b. the lack of re-examination of token working knowledge in the summary assessment process for drivers and ground staff employed by EWS (paragraph 91);
 - c. the signalling system did not allow the signaller to release just one particular token machine (paragraph 79);
 - d. poor safety-critical communications, led by the signaller (paragraphs 81, 85 and 88);
 - e. the lack of dissemination of the findings from the investigation into the 2 May 2007 incident to other operators of the line (paragraph 92); and
 - f. the conflict between the EWS local instructions, the rule book and sectional appendix (paragraph 89).

Observations

- 97 The driver of train 6P27 was not tested for drugs and alcohol after the incident as the EWS operations manager maintained that the driver had done nothing wrong. It was not possible for the operations manager to have known whether this was the case and, as he was involved in an operating incident, the driver should have been tested.
- 98 The Freightliner operating instructions for the line do not comply with rule book module TW6 in that they require the shunter to obtain the token from the machine, rather than the driver. The shunter is not authorised by the sectional appendix to do this.

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

- 99 The Network Rail local operations manager has issued clear instructions that the verbal permission of the signaller must be obtained before taking a token out of the token machine or returning a token. These instructions have been posted adjacent to all the token machines on the Aylesbury to Claydon L&NE Junction line (paragraph 96 c).
- 100 Network Rail has re-briefed and assessed the signaller so that he asks the relevant questions to ensure a clear understanding is reached during safety-critical communications (paragraphs 95 and 96 d).
- 101 EWS has reviewed the planning process at Acton which allocates ground staff to locations to avoid staff being rostered to work at locations that they are not familiar with (paragraph 96 a).
- 102 EWS has taken steps to monitor the safety-critical communications made by the shunter involved in the 27 August 2007 incident. The shunter has been briefed on the EWS policy on refusal to work on the grounds of safety (paragraph 96 d).
- 103 EWS is incorporating the process for token working into their supplementary operating instructions and into the summary assessment briefing and training day for drivers and ground staff (paragraph 96 b).
- 104 EWS are changing their procedures so that rule book module TW6 is issued to all ground staff who are required to operate token machines.

Recommendations

105 The following safety recommendations are made¹:

Recommendations to address causal and contributory factors

- 1 All freight operators should revise their operating instructions for single lines with intermediate token instruments to state clearly that the token must not be returned while any part of the train is on the single line. This should be included in the regular briefing/assessment process (paragraphs 96 b and 98).
- 2 EWS should introduce processes so that all shunters are fully briefed on the method of operation of all locations at which they are required to work (paragraph 96 a).
- 3 Rail Safety and Standards Board (RSSB) should devise a means of disseminating to the industry safety lessons from incidents which are not so urgent as to require an NIR (paragraph 96 e).
- 4 Network Rail and the operators who use this line should agree who is authorised to receive and deliver the token and update the sectional appendix and/or their operating instructions accordingly (paragraph 96 f).

¹ Duty holders, identified in the recommendations, have a general and ongoing obligation to comply with health and safety legislation and need to take these recommendations into account in ensuring the safety of their employees and others.

Additionally, for the purposes of regulation 12(1) of the Railways (Accident Investigation and Reporting) Regulations 2005, these recommendations are addressed to ORR to enable them to carry out their duties under regulation 12(2) to:

- (a) ensure that recommendations are duly considered and where appropriate acted upon; and
- (b) report back to RAIB details of any implementation measures, or the reasons why no implementation measures are being taken.

Copies of both the regulations and the accompanying guidance notes can be found on RAIB's website at www.raib.gov.uk.

Appendices

Glossary of abbreviations and acronyms

Appendix A

EWS	English, Welsh and Scottish Railway Company
ORR	Office of Rail Regulation
IECC	Integrated Electronic Control Centre
OPSWEB	Operations Website – the website of the operations focus group led by RSSB
RSSB	Rail Safety and Standards Board

Glossary of terms

Appendix B

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

Change ends	The action of a train/locomotive driver when he transfers his driving position from one end of a train/locomotive to the other.
Electric token block	A signalling system for single lines based on the issuing of tokens to trains for each section. Only one token may be released at a time and trains may not enter the section without a valid token ensuring that only one train may occupy each section at one time.*
Fatigue and risk index	A method of assessing the risk of an error being made by someone who is tired. The fatigue risk index was developed for the Health and Safety Executive.
Ground frame	A small group of signal and point levers located close to some isolated and infrequently used facility such as a trailing crossover. These levers are locked by the controlling signal box and only released when required. Alternatively, the levers may be released by means of a key attached to a train staff.*
Ground staff	A generic term to describe any train operating staff who do not work on the train.
Mobile operations manager	A Network Rail manager who is tasked with managing the aftermath of an operating incident.
Normal position	For a set of points, this is the default position, decided generally as being the position which permits the passage of trains on the most used route.*
Run round move	The act of moving a locomotive from one end of the train to the other.*
Sectional appendix	The publication produced by each Network Rail route containing layout and location details for operational features such as signal boxes, level crossings, local instructions, etc.*
Signed for	When a driver has completed their route knowledge they are then permitted to sign the road and drive that route unsupervised.*
Single line token	A train staff used in conjunction with a system of electrical devices which are interlocked with the signals to prevent conflicting movements.*
Special train notice	An operating document giving details of an additional train which is to run and any special operating instructions for it.
Token instrument /machine	The electrical equipment in a signal box, or other place, used for the issue and return of tokens in electric token block.*

The electric token block system works as follows:

1. Assume that a train is required to run from one end of a single line (signal box A) to the other (signal box B) and that all tokens are back in the machines.
2. The signaller at A establishes that the line is clear and contacts the signaller at B to ask permission for the train to run.
3. The signaller at B, if he agrees, operates a token release switch.
4. The signaller at A simultaneously operates his token release switch by moving a token to the release position in the machine and turning it (Fig 6).
5. This releases the token and the signaller at A withdraws it.
6. Once the token is removed from the machine, both token machines are locked (even if the release switches are operated) and remain locked until the token is returned to either machine.
7. The train driver takes the token as his authority to proceed over the single line.
8. When the train arrives at B the token is put into the machine there and this unlocks the machines ready for the next train to use the single line section in either direction.

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Department for Transport.

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