DEPARTMENT OF TRANSPORT

RAILWAY ACCIDENT

Report on the Collision that occurred on 3rd January 1976 at Worcester Tunnel Junction

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BRITISH RAILWAYS

LONDON: HER MAJESTY'S STATIONERY OFFICE

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RAILWAY INSPECTORATE,
DEPARTMENT OF TRANSPORT,
2 MARSHAM STREET,
LONDON SW1.

28*th September* 1977.

SIR,

I have the honour to report for the information of the Secretary of State, in accordance with the Order dated 14th January 1976, the result of my Inquiry into the collision between a light locomotive and a parcels train that occurred at about 09.25 on Saturday 3rd January 1976 at Worcester Tunnel Junction in the Western Region of British Railways.

Whilst Time Interval working was in force between Droitwich Spa and Worcester Tunnel Junction Signal Boxes, following a failure of all communications caused by high winds on the evening of 2nd January, a diesel locomotive travelling light from Bescot to Gloucester collided at a speed of about 45 mile/h with the rear of the 05.30 Birmingham Curzon Street to Worcester parcels train as the latter was about to pull away from a stand at the Worcester Tunnel Junction Up Home Signal. The leading cab and access compartment of the light locomotive were completely destroyed and it was partially derailed; the sole vehicle of the parcels train was severely damaged and its bogies were displaced and derailed.

I regret to report that the driver and guard of the light locomotive were both killed and the crew of the parcels train were treated in hospital for shock but were discharged the next day. The emergency services all reached the site within 15 minutes but the severe damage to the front end of the locomotive made the recovery of the bodies extremely difficult. Both lines were obstructed as a result of the collision. Re-railing was completed by 20.00 and the lines were made available for traffic at 22.59 the same day. The collision occurred on a clear windy day in bright sunlight.

DESCRIPTION

The Site and Signalling

1. The collision occurred in the section between Droitwich Spa and Worcester Tunnel Junction of the double track main line between Birmingham and Worcester. The line, which is worked on the Absolute Block System, runs generally straight with a slightly undulating profile roughly north to south with the Up direction being towards Worcester and mileages measured from Paddington. The maximum line speed is 75 mile/h. The line passes through Rainbow Hill Tunnel (196 yards) just to the north of Worcester Tunnel Junction Signal Box.

2. The signal box at Droitwich Spa, at 126 miles 572 yards, stands between the converging lines from Birmingham to Worcester via Kidderminster and via Bromsgrove with the Kidderminster line to the west. It is provided with lower quadrant semaphore Up Home, Starting, and Advanced Starting Signals, the latter being controlled by the position of the block instruments. The station lies to the south of the signal box.

3. Worcester Tunnel Junction Signal Box stands at 120 miles 1,584 yards between the diverging lines to Worcester Shrub Hill and Hereford with the Hereford line to the west. The Up Home Signal, close to which the collision occurred, is situated in the cutting 436 yards from the signalbox and 70 yards to the north of Rainbow Hill Tunnel, 6 feet 2 inches to the left of the Up line with a telephone at its foot connected to the signalbox. It is a bracket signal carrying three lower quadrant home signals respectively 24 feet, 28 feet and 26 feet above rail level which, reading from left to right as viewed by a driver, control movements to Worcester Yard, Shrub Hill Station, and Hereford. It comes into view at a distance of 840 yards against a background of the green surface of the hill rising to a height of about 60 feet above rail level behind the tunnel portal. The centre and right-hand posts carry fixed Distant Signals and there is an AWS permanent magnet 200 yards in rear. Extending 200 yards in rear of the signal is a berth track circuit designated AA.

4. The 2-aspect colour-light Worcester Tunnel Junction Up Distant Signal is 1,888 yards from the signalbox and is equipped with AWS. It comes into view at a distance of 1,428 yards and is replaced to Caution, if cleared, by the lever being placed to the normal position in the frame. Signalling and telephone circuits are carried between the two signal boxes on a telegraph pole route located at the side of the railway line. The plan at the back of the Report shows details of the line, landmarks, and the position in which the vehicles came to rest.

The Trains

5. The 05.30 Birmingham Curzon Street to Worcester Shrub Hill parcels train (3V01) consisted of locomotive No. 31 241 hauling a single General Utility Van (GUV); it had a length of 117 feet 4 inches and a total weight of 138 tons 11 cwt, the brakeforce being 104 tons. The light locomotive (travelling with 'B' cab end leading) was Class 52 No. 1055 with an overall length of 68 feet, a weight of 109 tons, and a brake-force of 83 tons. Under normal conditions the parcels train would have been permitted to travel at line speed and the light locomotive would have been restricted to a maximum speed of 65 mile/h.

The Course of the Collision and the Damage Caused

6. The high winds of Friday 2nd January 1976 caused trees and telegraph poles to fall across both lines and several spans of wire to be brought down between Droitwich Spa and Worcester Tunnel Junction Signal

Boxes severing all communications at about 20.45. After the obstructions had been removed at about 00.10 on 3rd January, Time Interval working was introduced by both signalmen. Among the trains which then travelled from Worcester Tunnel Junction to Droitwich Spa was the 18.15 Class 6 train from St Blazey to Longport worked between Gloucester and Bescot by a Gloucester driver and guard who normally return from Bescot with the 04.27 freight train from Stoke-on-Trent to St Blazey using the same locomotive. This was the crew and light locomotive involved in the collision.

7. After the passage, under Time Interval Working, of a number of trains in both directions 3V01 arrived at Droitwich Spa at 09.04 and was admitted to the section at 09.08. The light diesel locomotive arrived at Droitwich Spa at 09.13 and entered the section at 09.18. The collision occurred some 6 minutes later just as the driver of 3V01 was releasing the brakes of his train, having reported his arrival at Worcester Tunnel Junction Up Home Signal by telephone to the signalman. The actual point of collision was 57 yards before the signal and the light diesel locomotive came to rest approximately 20 yards from the signal and 5 yards from the rear of the badly damaged GUV; the parcels train having been pushed forward about 30 yards coming to rest with the rear buffers of its locomotive about 5 yards on the tunnel side of the signal.

8. The leading four wheels of the leading bogie of locomotive No. 1055 were derailed and the body sustained severe damage at the leading end, the cab and access compartment behind being completely destroyed back to the engine room bulkhead, a distance of about 9 feet. There was little significant damage below buffer level. One pair of wheels of each bogie of the GUV was derailed; both bogies were torn from their mountings, the rear bogie was pushed towards the leading end of the vehicle, and the rear 12 feet of the van was split open and forced upwards some 4 feet by the force of the impact. The GUV was buffer locked with its locomotive, the rear end of which suffered minor damage and some slight distortion to frame and cab doors and windows.

9. The driver of the light locomotive was Driver A. J. E. Jenkins of Gloucester Depot who was 62 years old and had been a driver for nearly 18 years. He had been stationed at Gloucester for 27 years and had re-certified his route knowledge on 11th September 1975. With him was Guard L. R. Greatorex aged 46 years who had been a guard stationed at Gloucester for over 23 years. Both men had worked together during the week of the accident with a Rest Day on the Monday and being off duty on the Tuesday (a Public Holiday). The duty required both men to book on at 01.15 and to relieve the train crew of the 18.15 St Blazey to Stoke freight train (6M55) at 01.45, departing Gloucester Yard for Bescot at 01.58 and arriving at 04.17. Until departing Bescot at 06.45 with the 04.27 Stoke to St Blazey (6V53) freight train the crew worked the locomotive to and from the Holding Sidings at Bescot where it was fuelled, and took a break. They were due to arrive at Gloucester Yard at 08.45 and to book off duty at 09.15.

Rules and Regulations

10. Extracts from the British Railways Rule Book and the Regulations for Train Signalling, which cover the failure of block signalling apparatus and telephones, are reproduced in Appendix 1 to this Report.

Evidence

As to the Operation of the Time Interval Working

11. On duty in Droitwich Spa Signal Box on the morning of the accident was *Signalman A. E. Crowther*, who said that he came on duty at 06.00. Time Interval working was in force between Droitwich and Tunnel Junction and, apart from the telephones and block instruments, all the other signalling equipment was in good order. He had not used Time Interval working at this signal box before and the signalman whom he relieved told him that he had adopted a time interval of 17 minutes for freight trains. He had varied this interval according to the type of train, knowing that it was about 5 miles from Droitwich Station to the Tunnel Junction Up Home Signal and that a driver had to telephone on arrival at that signal. On average the difference between the time for sending 'Train Entering Section' and receiving 'Train Out of Section' was about 6 minutes for an express train, 7–8 minutes for a light engine, a passenger train, or a parcels train, and, depending on its destination at Worcester, 12–14 minutes for a freight train. He had drawn trains down to his signal box in the correct manner to give instructions to the crews on the working. For the trains coming from the Kidderminster direction he spoke to the drivers from the window at the Birmingham end of the signal box, but for those coming from Bromsgrove he had to go down to the ballast at the back of the signal box and speak from the off-side of the train. He thought that as a friendly gesture he might have said to some drivers "Keep a sharp look-out". None of the train crews to whom he spoke had asked any questions although all of them acknowledged the message in some way. He had correctly recorded the departure time for each train in the Train Register Book (TRB) and not the various intervals adopted.

12. He had despatched four trains to Tunnel Junction under Time Interval working before 3V01 arrived at 09.04 and he went down to the ballast to advise the driver of the circumstances. He spoke to the guard of 3V01 who was with the driver and thought that he said "The block instruments and the bells are out of order between Droitwich and Tunnel Junction. There is no telephone communication: all the telephones are out of order. We are working on the Time Interval system, and will you proceed cautiously through the section, and pass Signal 70 at Danger." After instructing the guard of 3V01, he returned to the signal box and recorded the time of departure as 09.06; the train did not have to stop for station duties but it departed slowly and he altered the time in the TRB to 09.08.

13. He told me that the light locomotive arrived from the Kidderminster direction outside his signal box at 09.13. The driver lowered his window and leant out whilst he spoke and he used the same words as he

had to the guard of 3V01 but could not see whether there was anyone with the driver because the windows were tinted. In addition he said to the driver, because he was expecting a train in the opposite direction, "Will you draw down to Signal 71 to clear the junction and I shall have to keep you for a minute or two until a suitable time has elapsed. Then I will clear Signal 71 and you will pass the Advanced Starting Signal at Danger and proceed cautiously to Tunnel Junction" and added "Keep a sharp look-out". The locomotive moved on to Signal 71 and about 5 minutes later, at 09.18, he cleared Signal 71, heard the driver sound the horn, made an entry in the TRB, and saw the locomotive going through the station although he could gain no impression as to how fast it was travelling. He told me that he adopted an interval of 10 minutes after 3V01 because the train had only one van and could make a reasonable speed. The distance that it had to travel was about 5 miles and 10 minutes allowed an average speed of 30 mile/h. He was quite clear as to the actions required of the train crew during Time Interval working on arriving at the far end of the section and had allowed for this in the interval of 10 minutes. He said that he felt that if the light locomotive had to stop quickly, it could do so in a very short distance. The next thing that happened was that the chargeman from the station telephoned to say that there had been a collision and he carried out protection.

14. *Relief Signalman A. G. Mifflin* was acting as look-out for bridge works at Droitwich Spa on the station side of the Advanced Starting Signal on the day of the accident. The signalman telephoned him and asked him to tell the driver of a parcels train standing at the signal to pass it at Danger under the conditions that he had already been told; however, as he left his cabin the train was moving off and so he returned and told the signalman what had happened. A few minutes later, before going back into his cabin, he noticed a light locomotive standing at Signal 71. About 9 minutes after he had first seen it, it passed him as he stood in the door of his cabin and entered the section at a speed which he thought was rather fast for the conditions under which trains were being signalled and which he estimated was about 30–35 mile/h.

15. The 07.00 Birmingham to Hereford diesel multiple-unit passenger train (DMU) driven by *Driver W. B. Shillingford* was one of the trains which travelled through the affected section before 3V01 on the day of the accident. After being stopped at Droitwich Spa Signal Box he was told by the signalman that there was no communication with Worcester, Time Interval working was in operation and that after station duties were complete the Advanced Starting Signal was to be passed at Danger and he could proceed to Worcester. He departed from Droitwich at about 08.09 and where he could see the line clearly, travelled at 40 mile/h, reducing his speed to 25 mile/h around curves, his speed in the area of the colour-light Distant Signal being about 45 mile/h. He had no difficulty in seeing any of the signals and his DMU was not fitted with AWS. The Tunnel Junction Up Home Signal was at Danger when he came to a stand at it, he identified himself to the signalman on the telephone, the signal was cleared, and he rejoined his train and carried on.

16. *Driver D.E. Pugh* drove the 06.58 DMU from Kidderminster to Worcester on the day of the accident preceding 3V01 through the section. He confirmed that the signalman at Droitwich Spa told him from the signal box window that Time Interval working was in force between Droitwich and Worcester, that all communications were down, and that he was to pass the Advanced Starting Signal at Danger. The signalman also told him the time at which the previous train had departed from Droitwich although he could not now remember what time was stated. Departing from Droitwich Spa at about 08.47 he drove at about 45 mile/h on straight track reducing speed to about 15–20 mile/h approaching bends. The sky was clear and the strong sun low down made it difficult on occasions to see the line in front of him; he could not remember having had to reduce speed because he could not see clearly but he thought he might have shut the throttle to bring the speed down slightly and, as he did not have the visor down, he definitely remembered shading his eyes with his hand. He received the correct AWS indications approaching the Tunnel Junction Up Distant Signal at caution and also the Tunnel Junction Up Home Signal with its fixed distant. He was shading his eyes when, shortly before getting to the underbridge, he began to brake to come to a stand at the Home Signal at Danger and used the telephone to contact the signalman.

17. On the morning of the accident *Driver A. P. Harrison* was driving 3V01 when, at Droitwich Spa Signal Box, the signalman came down on to the ballast and spoke to his guard. The guard told him that the signalman had said that there was no communication with Worcester Tunnel Junction and that he was working under the Time Interval System, that the last train had left about 10 minutes before, and that they were to pass the Advanced Starting Signal at Danger. The signalman lowered Signal 71 and he set off, not stopping at the station but pausing instinctively at the Advanced Starting Signal to think about passing it at Danger. He told me that it was a very clear sunny day with a few clouds, he was not using a sun visor nor wearing sun glasses and had no difficulty seeing the line or any of the signals, driving cautiously at about 15–20 mile/h and at a higher speed for some of the time. He remembered using the locomotive horn when he saw platelayers working by the lineside and said that he thought he received the correct AWS indication at both the Up Distant and the fixed Distant on the Tunnel Junction Up Home Signal. He began to brake by the last underbridge after the whistle board, stopping the train about an engine's length short of the Tunnel Junction Up Home Signal at Danger. He used the telephone beside the signal to tell the signalman that he was the driver of 3V01 at the Home Signal and was told to put his locomotive on shed after disposing of the train. He immediately walked back from the telephone to his train, getting no indication that another train was approaching, and as he sat down in his seat he saw that the signal was 'Off'. He released the brake valve and as he waited to create vacuum there was a severe bump which badly shook him; his guard had already left the cab when he got down from the locomotive to investigate. After seeing how serious the accident was he immediately used the telephone to the signalman asking for an ambulance, and, having agreed how protection would be carried out, proceeded forward with his detonators to protect the opposite line which was endanged by debris.

18. In charge of 3V01 was *Guard P. S. H. Craig* who was travelling in the leading cab of the locomotive and told me that at Droitwich Spa Signal Box the signalman spoke to him from the ground saying that there was no communication between Tunnel Junction and Droitwich, Time Interval working was in operation, they were to pass the Advanced Starting Signal at Danger and that the last train had gone approximately 10 minutes before; this he repeated to his driver. He had never been involved in Time Interval working before but had no difficulty in hearing what the signalman said to him or in repeating it. They set off at about 09.07 and stopped momentarily at the Advanced Starting Signal, he thought this was involuntary because the driver was about to pass a signal at Danger. He had previously travelled through the section in the cab of the same train under normal circumstances with other drivers; on this occasion he described the speed at which they travelled as quite a bit slower and cautious but not over-cautious, he thought the highest speed they reached was about 30–35 mile/h but it had varied. He thought the train had been standing at the Home Signal between a minute and a half and two minutes when, as the driver sat back in his seat and released the vacuum brake, it was struck in the rear and received what he described as "not so much an impact as a tremendous push forward". He took his detonators and flag and went back to protect the rear of his train.

19. *Signalman W. J. Neale* was on duty in Worcester Tunnel Junction Signal Box from 22.00 on 2nd January to 06.00 on 3rd January 1976. When he came on duty the lights were out because a lighting pole was down and the man whom he relieved said there were trees and telegraph poles obstructing the line, with a train waiting on the Down Goods line for clearance. The telephones, block instruments, and block bells were out of action. After a message via the Post Office telephone and the local supervisor, that a locomotive which had gone to clear the line had reached Droitwich, he introduced Time Interval working. He told me that he adopted an interval of 15 minutes to Droitwich for all trains, because trains running under normal conditions usually took between 11 and 12 minutes and those following one another closely took between 15 and 16 minutes as the Droitwich Distant Signal would be against them. He knew that because there was a tunnel in the section the minimum time interval he could allow was 10 minutes and so, allowing for trains to come to a stand at Droitwich for the drivers to tell the signalman which trains they were, he decided upon 15 minutes. He remembered speaking to the crew of the 18.15 St Blazey to Longport train which came to a stand outside his signal box with the driver nearest to him. The actual words he used to the driver were "Well, driver, its Time Interval Working between the Tunnel Junction and Droitwich and I want you to proceed with a caution, pass my Starting Signal at Danger, the previous train has left to give you enough time". Then he said "Now I will have a word with the guard" and the driver replied "Right-ho, he is here with me". The guard came to the driver's window and he repeated what he had said adding that there had been trees and telegraph poles down and saying "It's been a complete failure, so careful how you go", he thought the driver must have heard the latter words because he spoke to the guard past him. The guard acknowledged what he had said, the train pulled away quietly past the Starting Signal, and he was sure that they had perfectly understood.

20. On duty in Worcester Tunnel Junction Signal Box from 06.00 on 3rd January was *Signalman C. Haines* who said that Time Interval working was in force with an interval of 15 minutes for trains from Tunnel Junction to Droitwich. All the other signalling equipment was in good working order and the failure had already been reported. There were no visitors to the signal box during the early morning other than the lineman and he had occasionally attempted unsuccessfully to use the telephone to Droitwich Spa. He told me that he had not asked for a hand-signalman to be stationed at the Up Home Signal because the man whom he relieved had not felt that it was necessary and he found that he was able to draw trains inside the protection of the signal quickly. The normal running time between Tunnel Junction and Droitwich varied from 6 minutes to about 10 minutes depending on the type of train and during the early morning of his turn of duty he despatched 4 or 5 trains to Droitwich Spa. At about 09.22 track circuit AA was illuminated on his diagram, he booked the arrival time of a train as 09.23 and after about a minute the telephone rang and when he answered it a driver said "This is the Curzon Street at the signal". He passed on to the driver a message which had been left regarding the disposal of the locomotive, obtained 'Line Clear' from Shrub Hill, and reversed the lever of Signal 5. He thought that about a minute elapsed between putting the telephone down and clearing the signal, and he recorded the time at which he had lowered the signal as 09.24. One minute later at 09.25 he received another telephone message from someone at the signal who said "Don't let anything come on the opposite line, something is up the back of us"; the person also said that they were going to place protection on both lines and rang off. After that he carried out protection and dealt with numerous telephone calls for assistance.

As to the Running of Locomotive No. 1055

21. On the morning of 3rd January the supervisor at Bescot in charge of train crews for relief purposes and movements that had to be made with locomotives was *Inspector W. S. Phillips*. He told me that at about 07.47 he received a telephone call from the driver of locomotive No. 1055 who said that he required fuel, water, and a personal needs break, and also a Conductor back to Stourbridge because he was 3 hours late and was not prepared to work his booked train back. Since the train that should have been worked back by this locomotive was ready and waiting the driver was offered a secondman to accompany him on the working but he did not accept, and since Bescot drivers were not conversant with the Class 52 locomotive it had to be worked back by the original driver. The driver then rang off and he spoke to the relief controller at Birmingham who knew that the driver wanted a Conductor via Galton Junction. At about 08.00 the guard telephoned and asked where the Conductor was, saying that they had already taken fuel and water having been at Bescot since 07.10; he replied that he would send a Conductor straight away and did so. He was quite certain that they had taken both fuel and water and that the driver had actually said that he wanted to finish early. The

two conversations over the telephone were quite civil and it was only because they had not reported their arrival at 07.10 that he had not realised that they had taken both fuel and water.

22. *Driver E. R. Burford* acted as Conductor to Stourbridge Junction and told me that he had been a passed secondman for 10 years and a driver for 18 months and had booked on duty at 06.00 as a spare driver. The locomotive departed at 08.10 with himself and the driver and guard in the front cab. The driver explained that he needed a Conductor because, although they had travelled to Bescot via Galton Junction, they normally returned via Dudley and he did not know the route via Galton Junction in the other direction. He had never travelled on a Class 52 locomotive before but found the driver's desk similar to that of the Class 45 and 46 locomotives. He stood at the driver's right shoulder with his back to the handbrake wheel watching the speedometer and the air pressure gauge when the driver used the brake. It was a bright sunny morning, dazzling at times, and he could not remember the position of the visor although he was sure that the driver was wearing a cap. During the journey they talked about the weather and the driver told him what a good locomotive he thought the Class 52 was, being better than the Class 45 or 46 because there were two engines so that if one went wrong the other was there to get one out of trouble. The guard made them a cup of coffee and was more talkative than the driver who would talk when spoken to but didn't make conversation. He advised the driver of the speed restrictions and signal locations where necessary and said that he obeyed them driving a little more slowly than the speed which had been suggested. In general the locomotive was driven rather slower than he would have travelled and the driver seemed a little wary of the air-brake, commencing to use it early; on a couple of occasions he had to put on power to get up to a signal. Burford told me that the AWS was working properly and thought that he had heard both the bell and the buzzer, the latter sounding in the tunnel at Handsworth. They came to a stand twice at signals and on both occasions the driver drew the locomotive slowly up to the signal, got out of his seat, went to the telephone, and did not seem to be rushing exceptionally. He had not noticed the position of the 'Passenger/Goods' switch because he did not know where it was on that class of locomotive. So far as he was aware the locomotive accelerated, ran, and braked normally, and the driver and guard made no comment apart from saying that it was a good locomotive.

23. At about 09.10 on the morning of 3rd January *Track Chargeman M. Kontic* began clearing rubbish and obstructions that had fallen on the line on the up side at about 121 miles 35 chains close to and on the Droitwich side of the platelayer's cabin. The first train to go past consisted of an engine and a van which he knew was 3V01, he did not watch the train go past but went to the fence and acknowledged the driver's whistle and guessed that it was travelling at about 25/30 mile/h. He then moved to the Down side and after an interval which he thought was 8–10 minutes he watched the light locomotive go past him travelling at about the same speed as 3V01 although he was not able to say whether it was under power or coasting. He acknowledged the driver's whistle, saw two men in the cab and started work again. He then heard a bang and, looking down the line to the signal, saw the smoke; without shading his eyes he could see what was happening down by the signal although the sun was shining strongly on the line where it was not shaded by the hill.

As to the Action after the Accident

24. *Supervisor A. C. Bellamy* was responsible for the maintenance of signalling and telecommunications in the Worcester area. He described to me the situation that he found late on the evening of 2nd January and how he arranged to find out the extent to which damage had been done to signalling and telecommunications equipment. He explained what he personally had done to assist in clearing the line and how he had deployed his assistants. He also explained the way in which he assessed the priority to assign to the different parts of the repair work and said that by 06.30 on 3rd January he knew that on the Droitwich to Tunnel Junction section about ¾ mile of wire was involved and that Time Interval working had been introduced and was working satisfactorily. He therefore concentrated repair work on the section between Worcester and Norton Junction.

25. When the accident occurred he was talking on the telephone to the signalman in Tunnel Junction Signal Box and went there to find that the levers for the Up Distant Signal and the 3 Home Signals were all in the 'Normal' position with the Home Signal arm indicators showing 'Wrong' and the track circuit on the Down line through the tunnel showing 'Occupied'. He thought he saw a collar on the Up Home Signal lever but could not be certain. At the scene of the accident he found that a derailed wheel had cut through cables and earth wires causing the track circuit and arm indicator failures. He tested the AWS magnets at the Distant and Home Signals on the Up line and found that both the permanent magnets were of the correct polarity and normal strength; the electro-magnet at the Up Distant Signal was completely neutral. He told me that the signals concerned, which I had seen on the morning of the Inquiry, had not been adjusted or altered since the date of the accident. I asked *Mr. R. Pease, Divisional Signal and Telecommunications Engineer* if he was satisfied that the work had been done as expeditiously as possible, bearing in mind the considerable disruption that there had been on that night, and he said that considering the total number of failures, and Worcester was particularly badly hit, the staff had done as much as they possibly could to restore services to normal or to do emergency repairs.

26. *Divisional Traction Inspector H. A. Jones* received a telephone message from the signalman at Tunnel Junction at 09.27 telling him of the collision and immediately went to the signal box where he was told what had happened and that the emergency services were being alerted. He left the signal box and ran through the tunnel meeting the driver of 3V01 who, although shaken was protecting the Down line; he said that he would arrange for the driver to go to hospital for a check-up. After seeing the cab of the light locomotive he realised that he could be of no assistance to whoever was in it. He found a signalman whom he sent to bring the guard back from protecting the rear of his train to go to hospital and to ensure that protection had been properly applied. By the light locomotive he found, and took charge of, the guard's Bardic lamp with his name

on a brass plate on the front of it and log book, and an AWS indicator from 1055 which was showing all black. By then he knew that the line was protected and took the items to the signal box. He returned to the site at 10.25 and took charge of the controller unit, automatic brake valve and straight air brake valve, and the speedometer which indicated 24 mile/h. These had been thrown out of the front cab by the Fire Brigade as they extricated the bodies of the crew and might well have been jarred or damaged. The controller was in the 'Engine Only' position, the automatic brake valve was in the 'Emergency' position although the handle was broken off, and the straight air brake valve was in the 'Off' position but was very loose. When he first went to the scene of the accident, he had noted the position of the sun which would have been to the left of the signals as the driver was facing them and he thought that the diffused sunlight from the halo round the sun might be directly in the driver's eyes as he came over the road bridge at Brickfield. To the rear of the Class 52 locomotive and for a distance of about 13 sleepers from its trailing end there were good clean bright skid marks on the rails which he thought might have been the result of an emergency brake application rather than the application of the brakes due to the collision.

As to the Tests of Locomotive Equipment

27. The *Divisional Locomotive Engineer Mr. W. Harland* told me that all the defects which had been reported during an inspection of No. 1055 at Old Oak Common on 13th December 1975 had been subsequently repaired and finally signed off by the running shed supervisor at Laira on 22nd December 1975. He carried out tests on the items removed from the cab and when he tested the brake valve, the pressures produced by the initial, full service, and emergency applications were all correct, indicating to him that the valve was correctly calibrated and there was no reason to suspect that it had not been working perfectly normally before the accident. The brake gear on the bogies was also checked; all the brake cylinders were operational the seals were good, the brake blocks were in good condition and at least 2 inches thick and all the equipment was in good working order.

28. He explained that the controller pedestal which carries the Forward/Reverse handle and the controller which acts as both a power control and isolation mechanism for the Driver's Safety Device (DSD) had been damaged but whether in the collision or during its subsequent removal from the locomotive he could not say. The top casting had cracked through and the casing had been distorted although the cam wheels, the block, and the interlock lever between the two controller barrels did not appear to have been badly distorted. Both the controller barrels had almost completely disappeared, leaving just broken pieces of barrel at the top of each shaft, a few of the contactors, and small parts of the pipe-work. The control air valve with other parts of the valve, although completely detached, were lying at the base, the bottom plate was missing, and on the surface of the desk both the controller handle and the Forward/Reverse handle had broken right off, the former being held on only by the wires going to the DSD. Although the controls had been found with the throttle closed and the controller handle in 'Engine Only' the scuffing and bruising marks on the toothed wheel which forms the selector notches for the Forward/Reverse handle might have been made if the roller had been forced into, and out of, each notch in turn during the collision, ending up with the equipment in the position in which it was found. Thus it was impossible to infer with any certainty whether the locomotive was under power or coasting immediately prior to the accident.

29. Because the speedometer case was quite badly damaged and the glass broken it could not be tested; he had noticed that when he first saw it, it was registering 25 mile/h although it was now showing 10 mile/h; his conclusion was that it could not be relied upon as evidence of the speed at the time of the collision which might have been higher than that recorded when the speedometer was found. The tests carried out on the tacho-generator when connected to a speedometer showed that the generator was producing a reading 0·3 mile/h high at lower speeds increasing to 2 mile/h at a speed of 90 mile/h. The AWS indicator from the 'B' cab end was showing all black but in the course of moving it to Worcester it had changed several times and it is known that reliance cannot be placed on the last indication shown since it can be altered by a shock. The AWS indicator in the 'A' cab was also showing all black which is normally displayed except when a horn warning indication has been cancelled causing the indicator to display yellow spokes until passing over the magnet at the next signal when it is automatically restored to all black. It was not possible to obtain any evidence from the AWS pick-up equipment under the bogies. He described the locomotive's general maintenance condition as good; it was due for an 'A' examination within an hour or so, the next period examination, a 'C' examination, was not due for another 216 hours and nothing had been recorded in the locomotive repair book since 27th December. Finally I asked the *Divisional Maintenance Engineer Mr. R. Hamer* to summarise the results of the tests and the locomotive's maintenance state and he said that he was satisfied that the tests had been correctly carried out as far as the extensive damage to the locomotive's air system would permit and that he was in agreement with all the statements that had been made and the conclusions that had been drawn.

30. Braking tests with a Class 52 locomotive were carried out on Sunday 4th January by *Inspector L. Whitley* at approximately the same time as the accident when the weather during the first run was dull with drizzle and during the second run dull with heavy rain at times. He told me that he thought the effect of the wet weather would have been to increase braking distances slightly above those found with dry rails. In the first test a train with the same composition as 3V01 was positioned at Tunnel Junction Up Home Signal and locomotive No. 1030 entered the Up line section at Droitwich Spa attaining a speed of 60 mile/h before reaching the AWS magnets for the Tunnel Junction Up Distant Signal at caution where the controller was shut and no action was taken to cancel the AWS horn or to apply the brake. The locomotive came to a stand after 820 yards in 35 seconds, about 20 yards on the approach side of the underbridge at 121 miles 50 chains. After driving forward, the first sight of the rear of the GUV was obtained from the cab at 121 miles 46 chains,

some 4 chains after the first sight of the Tunnel Junction Up Home Signal. For the second test the trial locomotive again entered the Up line section from Droitwich Spa attaining a speed of 60 mile/h; at the 'Sound Whistle' board for the King George V playing field foot crossing the driver shut off power and made an emergency brake application while the secondman left his seat and attempted to get as far as he could through the engine room. The locomotive came to a stand in about 370 yards, some 110 yards short of the stationary train and the secondman was able to reach the rear cab of the trial locomotive before it stopped. Inspector Whitley agreed that different locomotives would have different braking characteristics but said that the variations in braking distance would not be very great.

As to Pathological Tests

31. Due to the severe injuries suffered by the bodies of both driver and guard, examination proved exceedingly difficult. In neither case could any condition or evidence be found which might have explained the circumstances of the accident. I asked the pathologist and Fire Officers for any evidence which they could give me of the position of the bodies at the time of the collision or of the attitudes which they had adopted. All stated that any conclusions would be speculative but that it appeared that the driver's left hand might have been holding some portion of the controls and that at the time of the collision the driver appeared to have been in his seat whilst the guard could have been attempting to lie on the floor. Opinions however differed and one Fire Officer stated that he did not think that either man knew of the impending collision.

Discussion

32. I have ascertained that at the time of the accident the sun would have been at an angle of approximately 54° to the line of the railway to the driver's left as he faced the Up Home Signal and at an elevation of 7°. I am told that the braking distances for Class 52 locomotives running light are:

From 48 mile/h	1 in 392 falling 350 yds
	1 in 550 falling 345 yds
From 60 mile/h	1 in 392 falling 580 yds
	1 in 550 falling 575 yds

33. The evidence of the drivers of the three trains which preceded the light locomotive in the Up direction through the section is that Signalman Crowther correctly warned them that all communications had failed, that Time Interval working was in force, and that they were to pass the Droitwich Advanced Starting Signal (No. 70) at Danger. Although they did not mention specifically being told to proceed cautiously, all three considered it to be implicit in the instructions and Signalman Crowther was sure that he did tell all Drivers to proceed cautiously. I am sure that he similarly warned Driver Jenkins. Even if he omitted part of the instructions, because he was concerned to get the junction clear for the Down express, he must have told Driver Jenkins to pass the Advanced Starting Signal at Danger which he did and this, because the train crew had passed through the section under Time Interval working in the Down direction only a few hours previously, must have alerted Driver Jenkins to the circumstances.

34. According to the signalbox clocks, it took the light locomotive 6 minutes to travel from Droitwich Spa Signal 71 to the Tunnel Junction Up Home Signal. a distance of 5 miles 3 chains. Allowing for errors in synchronization or in reading the time, the journey could have taken, I estimate, as much as 7 minutes. The average speed of the light locomotive was therefore between 43 and 51 mile/h requiring a sustained maximum speed of between 46 and 55 mile/h or, if speed had been reduced before the collision, a higher maximum speed at some point.

35. Although I cannot accept Track Chargeman Kontic's estimation of the time that elapsed between the passage of 3V01 and the light locomotive or of its speed, his evidence indicates that the two men in the cab were acting normally. A normal brake application to bring the locomotive to a stand at the Tunnel Junction Up Home Signal from a speed of between 48 and 60 mile/h should have been initiated between a point shortly before the 'Sound Whistle' board at 121 miles 35 chains and the Brickfields Bridge at 121 miles 29 chains. The Up Home Signal and the rear of 3V01 would both have been visible over these distances although the train might have been difficult to see in the shadow of the deep cutting against the strong sun. From the damage caused and a very rough calculation of energy dissipated, I think that the speed of the light locomotive at collision was about 45 mile/h and that the speed had not been reduced, or reduced only slightly. From the point at which the braking should have commenced, the time taken to reach the point of collision would have been between 15 and 20 seconds.

36. The evidence given by the Fire Officers leads me to think that neither Driver Jenkins nor Guard Greatorex were aware of the impending collision until the last moment. No evidence could be found after the accident of a sudden brake failure nor of illness, and the behaviour of both men and the speed at which the locomotive was driven through the section does not indicate concern with the restriction of visibility due to the strong sun, with health, or with the efficiency of the locomotive. Certainly the locomotive was not being driven with the caution which the circumstances demanded.

Conclusion

37. Whenever the Driver of a train is instructed to pass a signal at Danger he is required by the Rule Book to proceed cautiously in accordance with the Signalman's instructions. Signalman Crowther had

correctly warned all other Drivers of the circumstances that existed, and had been clearly understood by them. I believe that he properly warned Driver Jenkins as he described and instructed him to pass the Droitwich Advanced Starting Signal at Danger. I conclude that Driver Jenkins then failed to proceed cautiously and to keep an adequate lookout, allowing his attention to wander to such an extent that either he did not realise he was approaching the Tunnel Junction Up Home Signal or, on seeing the signal cleared for 3V01 as he was about to brake to come to a stand at it and failing to see the other train ahead, he forgot the warning in Section H 3.21 of the Rule Book and assumed it had been cleared for him. The collision thus resulted from Driver Jenkins' failure to proceed cautiously and to observe the Rules applicable to Time Interval Working. I assume that Guard Greatorex also failed to assist him by keeping a look-out.

Remarks and Recommendations

38. It is difficult to find a reason for Driver Jenkins' (and Guard Greatorex's) failures. The only pointers are that they were some 3 hours late arriving at Bescot (07.10 instead of 04.17), Driver Jenkins' refused to work the booked train back despite being offered a secondman and being only about one hour late in departing from Bescot, and he said to Inspector Phillips that he wanted to finish early. The assumption is that Driver Jenkins might have had some reason for wanting to be back at Gloucester early and had become impatient at the delays caused by the effects of the high winds. I must point out that his manner on the telephone to Inspector Phillips, and to Driver Burford as Conductor, gave no hint of impatience or annoyance. If, however, Driver Jenkins did have in mind an arrangement which required him to be back at Gloucester on time at 09.15 this would go some way to explain his lapse.

39. Although the collision was caused by Driver Jenkins' failure to proceed cautiously and to observe the Rules applicable to Time Interval working, it is notable that Signalman Crowther made an allowance for cautious running, stopping, and telephoning the signalman of only 3 minutes in addition to the normal running time of 7 minutes for parcels trains, when calculating the time interval that was to elapse before he allowed the light locomotive into the section. Driver Harrison drove 3V01 cautiously, as he interpreted the circumstances, taking 15 minutes for the journey and a further minute for telephoning. Driver Jenkins apparently drove through the section at the speed for a light locomotive under normal circumstances. Neither Signalman Crowther not Driver Harrison bear any responsibility for the collision because they interpreted the Rules and Regulations sensibly. I am concerned, however, that the Regulations give little guidance to signalmen and resulted in one signalman calculating a time interval for the section in one direction that varied between 10 and 17 minutes depending on the type of train and for the other signalman to calculate a time interval in the other direction of 15 minutes which he did not vary.

40. I considered whether the minimum time intervals to be adopted for the purposes of Block Regulation 25a(iv) for the various classes of train should be included in the special instructions in each signal box. However the need to allow for different classes of train, the switching out of intermediate signal boxes, and the possibility of temporary speed restrictions would make this proposal impracticable. There was also a risk that the minimum might come to be regarded as what was normal and that the signalman might fail to take into account some circumstance which was not mentioned in the instructions. Accordingly I recommend that when the requirements of Block Regulation 25 are discussed with signalmen during their biennial examination, the time allowances that they should make for specific types of train to pass through a section shall receive special attention. I am told by the Officers of British Railways that this recommendation has now been completed.

I have the honour to be,

Sir,

Your obedient Servant,

A. G. B. King,

Major.

The Permanent Secretary,
Department of Transport.

RAILWAY ACCIDENT: REPORT ON THE COLLISION THAT OCCURRED ON 3rd JANUARY 1976 AT WORCESTER TUNNEL JUNCTION

Correction

The last sentence of paragraph 40, page 10 should read as follows: "I am told by the Officers of British Railways that this recommendation has now been implemented."

Department of Transport
London: Her Majesty's Stationery Office
January 1978

Section C. Fixed Signals

6. Joint Duties of Signalmen and Drivers (cont'd)

6.1. Conditions under which stop signals may be passed at Danger (cont'd)

(viii) When a train has to enter a section during failure of block instruments and/or bells. (Block Regulation 25 and Section H, clause 3.21).

Section H. Working of Trains

3. Duties of Drivers and Secondmen (cont'd)

3.21. Failure of block apparatus

When informed by the Signalman that the block apparatus has failed, the Driver will be verbally instructed to pass the section signal at Danger and he must then proceed cautiously as there may be an obstruction on the line or the section may be occupied. Should such advice be received when the train is standing at an intermediate block home signal the Driver must advise the Guard and the Driver of any locomotive assisting in rear, of the circumstances or, where a Secondman is provided, instruct him to do so.

If, having proceeded into a section where the block apparatus has failed, the Driver finds the signals for the signal box ahead in the clear position, he must not assume that the line is clear for his train.

Section K. Detention of Trains on Running Lines

4. Duties of Signalmen (cont'd)

4.6. Working of trains by Time Interval

When trains are being worked by Time Interval the Signalman must so advise the Trainmen and they must also be told that track circuits or similar apparatus must not be relied upon to afford the normal security.

Regulations for Train Signalling

25. FAILURE OF BLOCK SIGNALLING APPARATUS

In the event of a failure of block signalling apparatus so that trains cannot be block-signalled in the ordinary way, steps must be taken immediately to have the apparatus put into working order and the following instructions observed in the meantime:

(a) (i) Except as provided in clause (h) a train must not in any circumstances be allowed to pass a box into the section where the failure exists without having been previously brought to a stand and the Driver and rear Guard, also the Driver of a locomotive assisting in rear, if any, advised of the failure. If there is no bell or telephone communication with the box in advance trainmen must, in addition, be advised that Time Interval working is in operation in accordance with the Rule Book, Section K, Clause 4.6. The Driver or Drivers must also be instructed to pass at danger the section signal, in accordance with the Rule Book, Section C, clause 6, and to proceed cautiously.

When a driver has been stopped at a box and advised by the Signalman of the failure, the Driver must be instructed to draw his train forward and bring it again to a stand with the brake van near to the box to enable the Signalman to verbally inform the rear Guard, and the Driver of a locomotive assisting in rear, if any, of the failure; the Driver of the train locomotive must also be told that, after this has been done, he must not start again until he receives a green handsignal from the Signalman.

(ii) The Signalman at whose box the block instruments and/or bells have failed must advise the Signalman at the opposite end of the section concerned of the failure, by telephone. Where telephone communication is not available, the Signalman at the box in rear must instruct the Driver of the first train that is being cautioned to stop at the box in advance and inform the Signalman of the circumstances.

During the period of the failure, the Signalman at the box in advance must maintain at Caution the distant signal applicable to the line on which the failure exists.

(iii) When the bells only, or bells and block instruments, have failed and a telephone is available, the Signalman must send the necessary bell signals as messages on the telephone, for example:

Is †.....line clear for*	† Description of the line to be given; for example—up or down main, fast, slow, or goods.
† .....line is clear for*	
* .....train entering section	* Description of train to be given.
* .....train out of section.	
† .....line is clear for* ..... under the Warning Arrangement.	

A Signalman sending signals in this manner must satisfy himself that he is speaking to the Signalman who should receive the comunication.

When the bells have failed but the block instruments are still available, these must be worked in conjunction with the telephone messages.

When the block instruments only have failed, the bell signals must be sent in accordance with these Regulations.

A train must not be allowed to enter the section until permission has been received from the Signalman in advance in accordance with these Regulations.

(iv) When the bells have failed and telephone communication is not available, a train must not be allowed to proceed until the time usually taken by the preceding train to clear the section plus an allowance for the train having been stopped and having run at caution, has elapsed. In no case, however, must a train be allowed to proceed with a less interval than six minutes unless the Signalman can clearly see that the block section concerned is clear throughout. Where there is a tunnel in the section, an interval of not less than ten minutes must be allowed between two trains unless the Signalman can satisfy himself that the tunnel is clear.

(vi) When trains are signalled in accordance with paragraph (iii), all signals sent or received on the bell or telephone must be recorded whether the ordinary block signals are usually recorded or not, and when trains are being worked in accordance with paragraph (iv), the departure time of each train must be recorded.

(g) When trains are being worked in accordance with clause (a) (iv), all trains must be brought within the protection of the home signal as promptly as possible, and to obviate a train standing with its rear portion outside the home signal, the Signalman must, if necessary, authorise the Driver to draw forward a sufficient distance to bring the rear portion within the home signal.

If a train requires to stand outside a home signal for the purpose of attaching or detaching traffic, or through any other cause, the Signalman must, if practicable, obtain the assistance of a Handsignalman provided with the necessary detonators and handsignals, who must be sent out a sufficient distance from the rear of the train to afford protection. Until this Handsignalman has been provided, a train must not be stopped outside the home signal to attach or detach traffic.

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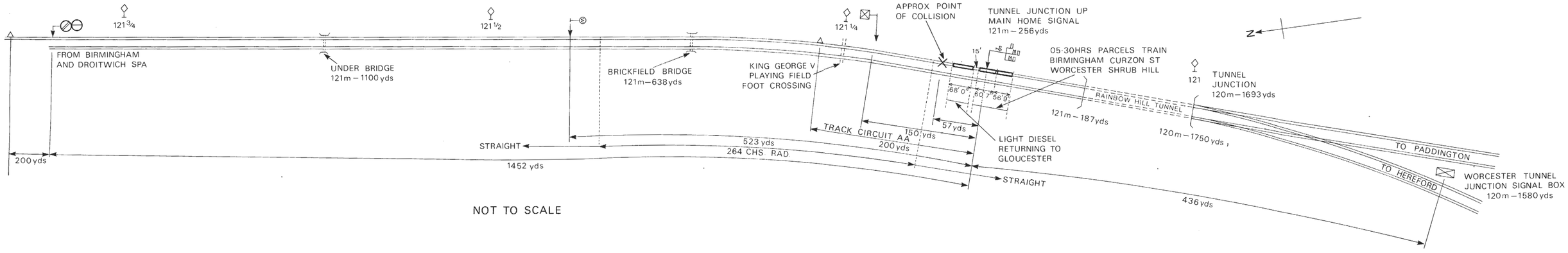
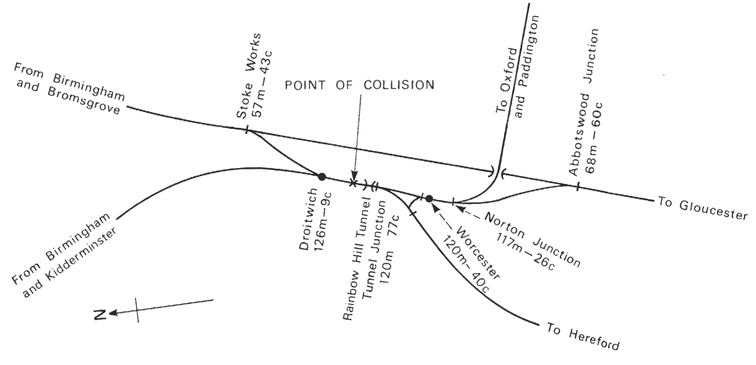
COLLISION AT WORCESTER TUNNEL JUNCTION WESTERN REGION AT 09·24HRS ON SATURDAY 3RD JAN 1976



NOT TO SCALE

LOCATION DIAGRAM



DROITWICH SPA