MINISTRY OF TRANSPORT & CIVIL AVIATION

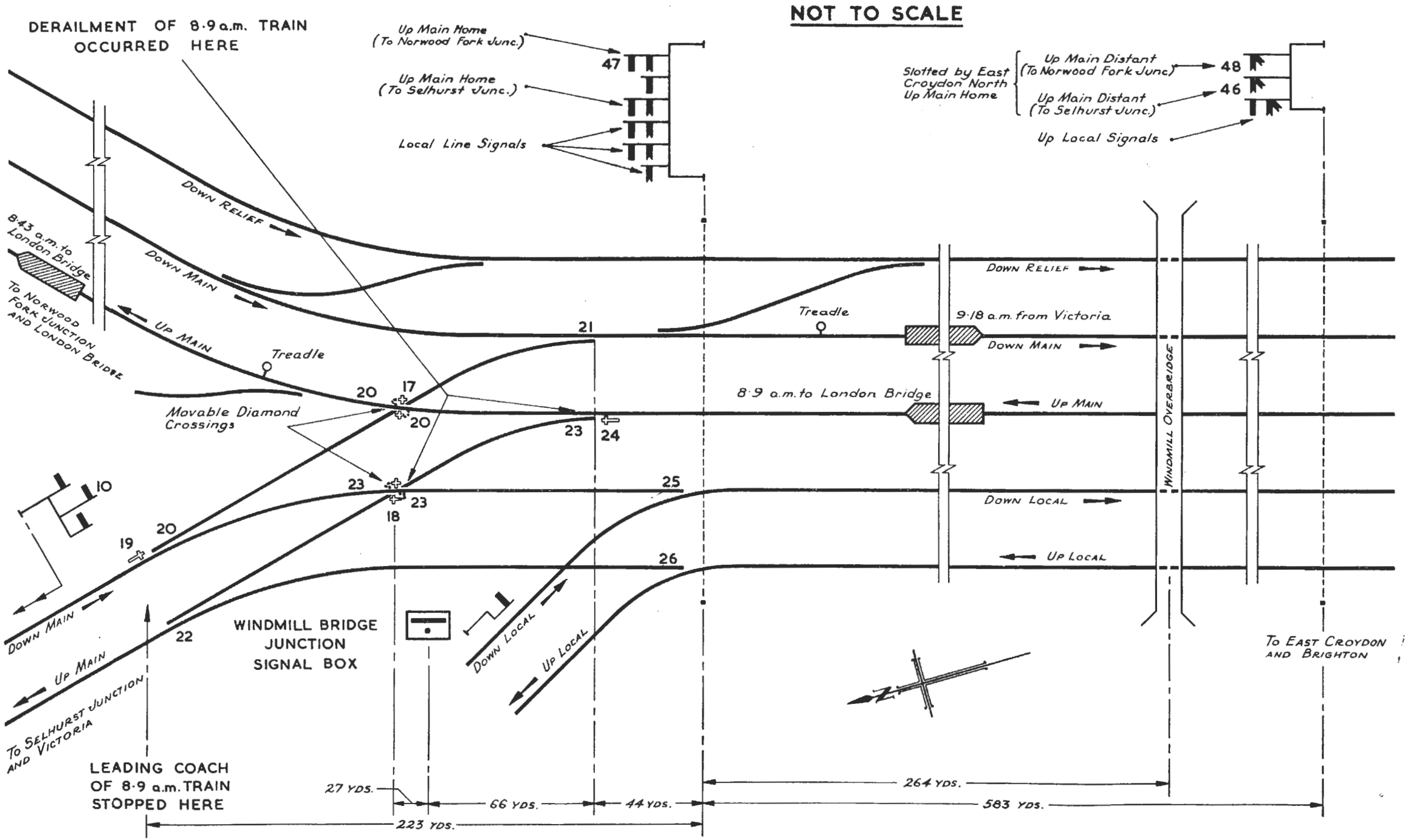
RAILWAY ACCIDENTS

REPORT ON THE DERAILMENT which occurred on 13th February 1954 at WINDMILL BRIDGE JUNCTION in the SOUTHERN REGION BRITISH RAILWAYS

LONDON : HER MAJESTY'S STATIONERY OFFICE

1954

SIXPENCE NET


NOT TO SCALE
DERAILMENT OF 8·9 a.m. TRAIN OCCURRED HERE
Up Main Home (To Norwood Fork Junc.)
Up Main Home (To Selhurst Junc.)
Local Line Signals
47
Slotted by East Croydon North Up Main Home
Up Main Distant (To Norwood Fork Junc.)
Up Main Distant (To Selhurst Junc.)
48
46
Up Local Signals
Down Relief
Down Main
Up Main
8·43 a.m. to London Bridge
To Norwood Fork Junction and London Bridge
Treadle
21
Movable Diamond Crossings
20
17
20
23
24
9·18 a.m. from Victoria
8·9 a.m. to London Bridge
Windmill Overbridge
10
19
20
23
23
18
25
26
22
Down Local
Up Local
Windmill Bridge Junction Signal Box
To Selhurst Junction and Victoria
To East Croydon and Brighton
Leading Coach of 8·9 a.m. Train Stopped Here
27 yds.
66 yds.
44 yds.
223 yds.
264 yds.
583 yds.

MINISTRY OF TRANSPORT AND CIVIL AVIATION,
Berkeley Square House,
London, W.1.

15th June, 1954.

SIR,

I have the honour to report for the information of the Minister of Transport and Civil Aviation in accordance with the Order dated the 16th February, 1954, the result of my Inquiry into the derailment which occurred at about 9.33 a.m. on Saturday, 13th February, 1954, at Windmill Bridge Junction, in the Southern Region, British Railways. This junction is just north of East Croydon and is where the main line from Victoria meets the main line from London Bridge to Brighton.

The 8.9 a.m. Littlehampton to London Bridge electric passenger train ran past a signal at Danger and became almost completely derailed on a movable diamond crossing when travelling at about 40 m.p.h. The train remained upright and travelled in a derailed condition towards Victoria blocking all the four main lines at the junction.

There were about 100 passengers in the train of whom four later complained of shock. All of them were transferred to a local train which left the site at 10.6 a.m.

The train comprised six screw coupled coaches, the front and rear of which were motor driven, and it was 133 yards long. It was fitted with the Westinghouse air brake and the brake shoe pressure available was 157 tons or 59% of the total weight of the train which was 266 tons. None of the coaches was seriously damaged.

Steam breakdown cranes were ordered from Nine Elms and Brighton and arrived without delay. The Down main line from London Bridge was reopened to traffic at 4.35 p.m. the same day and the Up main line to London Bridge and the Up and Down Victoria main lines were restored to traffic at 6.0 a.m. on Monday, 15th February, after the considerable damage to the permanent way and signalling equipment had been repaired. Traffic continued to run on the local and relief lines.

It was raining but the visibility was fairly good.

DESCRIPTION

At the site of the accident the lines run roughly North (Up) and South (Down). In the Up direction the lines approaching Windmill Bridge Junction are straight for some distance and fall at a gradient of 1 in 296.

The sketch opposite shows the arrangement of the lines in the neighbourhood of the junction, the relevant signals and the numbers of the points to which reference will be made, as they existed at the time. Since the accident the lines have been re-signalled with colour lights and continuous track circuiting and all the points and signals are power operated from a new box.

The junction points and signals were operated manually from Windmill Bridge Junction box which was equipped with a 48 lever mechanical frame. The main line points were worked by four levers, Nos. 20, 21, 22 and 23. Levers Nos. 20 and 23 each worked a movable diamond crossing and the appropriate facing points, and the two trailing points were worked by levers Nos. 21 and 22. The normal positions were as shown in the sketch. The derailment occurred on No. 23 facing points and movable diamond crossing. The mechanical locking was typical of that usually applied at such a junction to eliminate as far as possible conflicting routes being set up for opposing movements. The following extract from the mechanical locking table shows the relevant locking:—

Lever number	*Released by*	*Locking*
20	23	
21	20	
22	23	25,26
23	—	25,47
47	17	23,24
48	47	

Note.—Plungers Nos. 19 and 24 stand normally "in".

The signals were well sited semaphores. The Up main distant signals to Norwood Fork Junction and to Selhurst Junction (Nos. 48 and 46 respectively) had lower quadrant arms 39 feet 6 inches above rail level. They were repeated in Windmill Bridge Junction box and slotted with East Croydon North Up main home signal, which was also the section signal. They had an approach view of 260 yards and were 583 yards from the Up Main home signal, No. 47. The latter signal was also the section signal to Norwood Fork Junction box. It was on a gantry 110 yards from the box and 44 yards from facing points No. 23, and it could first be seen by the driver of an Up train when passing under Windmill Bridge, at a distance of about 260 yards.

The signalling of trains was by Sykes' Lock and Block. Among other things this system ensures that the signalman of the box in advance cannot release the section signal of the box in rear until the previous train had reached the treadle beyond the appropriate signal of the box in advance, and that signal has been replaced to Danger. In effect this meant that the Up main home signal at East Croydon North (which as mentioned slots the Windmill Bridge Junction Up main distants) and the Windmill Bridge Junction Up main home (No. 47) had to be replaced to Danger after each train.

Regulations

The following is an extract from the Block Regulations in force:—

"*Working of Fixed Signals at Junctions and other Diverting Points.*

When a signalman at a junction or other diverting point is not in a position to set up the route required for a train until the train is closely approaching the stop signals at such diverting points he must, as far as practicable, before he sets the points and lowers the signal for the required route, satisfy himself that, having regard to the position and speed of the train, it is safe for him to do so."

Report

The following are extracts from the Train Register at Windmill Bridge Junction. They refer to the 8.9 a.m. Littlehampton to London Bridge train, the 8.43 a.m. Brighton to London Bridge train which ran immediately ahead of the 8.9 a.m. on the Up main line, and the 9.18 a.m. Down Victoria to Portsmouth train. It will be noted that the 9.18 a.m. train passed through the junction between the other two trains, as booked.

	Rear Section			*Forward Section*		
Train	*Accepted*	*T.E.S. received*	*T.O.S. sent*	*Accepted*	*T.E.S. sent*	*T.O.S. received*
Up Trains						
8.43 a.m. ..	9.27½	9.30	9.30½	9.28½	—	9.31½
8.9 a.m. ..	9.30½	9.32½	—	9.31½	—	—
Down Train						
9.18 a.m. ..	9.27½	9.27½	9.33	9.32	9.32½	9.33½

Relief Signalman L. J. Carter was working at the Up end of Windmill Bridge Junction box (*i.e.* dealing with the Up trains) and Signalman C. G. Sivyer was at the Down end. They worked the junction points jointly. Carter had worked in the box continuously for some 5 months and Sivyer for over 10 years.

Carter had cleared the home and distant signals for the 8.43 a.m. Up train. He replaced the distant signal lever to normal as the train was nearing the home signal and saw from the repeater that the arm was at Caution. He could not remember whether it had been returned to Caution before he replaced his lever, *i.e.* when the slotted East Croydon North Up main home was returned to Danger, or when he replaced his lever; he was, however, certain that his repeater was at Caution. After replacing the home signal to Danger the junction was reversed for the 9.18 a.m. Down train from Victoria by Sivyer.

After "Train Entering Section" had been received for the 8.9 a.m. train, Carter saw it approach under Windmill Bridge and at the same time he noticed the 9.18 a.m. train starting to move over the junction. He then moved to the centre of the frame to wait for the latter train to clear the junction. As soon as it had done so and Sivyer had replaced lever No. 10, Carter started to reverse the junction points for the 8.9 a.m. train to go up the main line to London Bridge. He had already withdrawn plungers 17 and 19 and put back levers 21 and 20 to normal, and thought that he was about to put back lever 23 when he noticed the train passing in front of the box and still travelling "pretty fast". He could do nothing and saw it become derailed and stop. He could not remember operating lever 23 but he must have done so while the leading two coaches and the front bogie of the third coach were between the facing points and the movable diamond, because they became derailed at the diamond and the rest of the train at the facing points. The switch rails of the facing points were bruised and the movable diamond crossing was smashed.

Carter and Sivyer both looked at the Up main home signals and saw the arms were at Danger. Carter also confirmed that the Up main distant signal repeaters showed the arms to be at Caution.

Carter said that when he first saw the 8.9 a.m. train he could not tell at what speed it was running as it was coming straight towards him. He knew that the distant signal was at Caution and the home at Danger and he assumed it would stop at the latter. He did not therefore wait to see that it was slowing down to stop at the home before moving the junction points. He said that there had been no question of allowing the 8.9 a.m. train to take precedence over the 9.18 a.m. Down train at the junction. The latter was on time and although the 8.9 a.m. was about 5 minutes ahead of time they were to be passed over the junction in the booked order. A train had been accepted on the Up local line but the signals had not been cleared for it.

After the accident the guard of the 8.9 a.m. train came to the box and said the Up main distant signal had been Clear, but Carter replied that it was not so.

Sivyer said the 9.18 a.m. train was brought nearly to a stand at signal No. 10 because there was another train (from London Bridge) ahead on the Down main line. He did not see the 8.9 a.m. train until he heard the derailment. He confirmed that there had been no question of the latter preceding the Down train over the junction.

Sivyer came on duty at 6.0 a.m. and worked the box single handed until Carter's duty started at 8.0 a.m. Neither of them had adjusted any signal wires that morning and the lineman had not been in the box. The frame was working well and the Up main distants, which had been cleared for a number of trains before the 8.9 a.m., were in order and the repeaters showed that they were returning correctly to Caution.

Sivyer did not consider it was practicable to apply the Block Regulation quoted on page 4 on the Up main line. He said that electric trains stop so quickly that it would be necessary to wait too long to ensure that they were under control before moving the junction points.

Signalman T. A. Williams had worked at East Croydon North box, which is at the north end of the Up platform, for about 18 months and was on duty at the Up end. The Windmill Bridge Junction Up main distant signals were 133 yards north of the box and could be seen easily from it, and Williams saw signal No. 48 return to Caution when he replaced the lever of his Up main home signal after the passage of the 8.43 a.m. train. He confirmed that the arms of signals Nos. 46 and 48 were invariably restored to Caution by the action of the slot when he replaced his home signal to Danger.

He saw the 8.9 a.m. train, for which he had cleared all the signals, run through East Croydon Station at what he described as normal express speed – 50 to 60 m.p.h. – and said it did not appear to be slowing down as it approached and passed the distant signal in spite of the fact that it was at Caution. He remarked to the other signalman, who also saw the signal at Caution, that it looked as if the train was not going to stop at the Windmill Bridge Junction home signal.

Driver L. F. Chandler, who knew the section well, came on duty at 5.53 a.m. at Portsmouth and Southsea and after working some local trains he took charge of the 8.9 a.m. train from Littlehampton to London Bridge. He said that after stopping at all stations to Shoreham and at Hove, he had a good run receiving a slight signal check at Purley only. He was "coasting" as he passed through East Croydon under clear signals somewhat ahead of time. He saw the Windmill Bridge Junction Up main distant at Clear from about half way along the Up platform at East Croydon. After passing under Windmill Bridge he was still travelling at about 45 m.p.h. when he saw the Junction Up main home signal at Danger from a distance of about 100 yards. He applied the brake fully, released the deadman's handle and blew the whistle. He felt the brakes grip the wheels but they did not appear to stop the train quickly, possibly, Chandler thought, on account of the wet rails. He realised that the train had become derailed "just as I got by the signal", and then he found it was going on to the Victoria line.

Chandler was questioned closely about the signals and was insistent that the distant was at full Clear; also that he saw the Junction home at Danger and braked some distance before reaching it. The train actually travelled 223 yards beyond the home signal.

He said that the brakes of the train had worked correctly during the journey. He could not remember when he last looked at the pressure gauge but he had seen the train pipe needle at 70 lbs per sq. in. and the main reservoir needle at 90 lbs.

After the train had stopped he walked along it and went to the signal box. He did not speak to either signalman about the signals, but after leaving the box he told the guard that the distant had been Clear, which the guard confirmed.

Guard N. W. Smith, who also knew the road well, confirmed Chandler's account of the journey from Littlehampton and thought that the speed through East Croydon was about 35 – 40 m.p.h. which was normal for that train. The brake compartment at the rear of the train was fitted with a periscope and he was watching the signals. He stated that all the East Croydon signals and the Windmill Bridge Up main distant were at Clear. He was then about to take up his journal to book the passing time at Windmill Bridge box when he felt the train become derailed; he had not seen the home signal but knew that the whole train had passed it. He was very definite that he had felt no earlier emergency brake application.

After the accident he went to the box and told one of the signalmen that the distant was "Off" but he was informed he was wrong. Smith also was pressed on this point; he said he was sure the distant was at Clear but admitted that he might have been mistaken.

He had spoken to Chandler at Littlehampton and found him quite normal. The usual brake test was made before leaving.

The motorman of the 9.18 a.m. Down train said that his train passed the 8.9 a.m. train about half way between the junction and Windmill Bridge.

Area Inspector E. G. Akehurst arrived at the scene at 9.45 a.m., 12 minutes after the derailment. After satisfying himself that no passengers were injured he went to the box and saw that the Up main home signals were at Danger and that the repeaters of the Up main distants showed the arms to be at Caution. He then organised the transfer of the passengers to another train very efficiently. The local Ganger, H. J. Hyland, also acted very promptly and gave valuable assistance in helping to detrain the passengers.

The brakes of the train were examined after the accident and except for the damage caused by the derailment no defects were found. The signalling equipment was also thoroughly tested after the accident and found in order. The Up main distant signal No. 48 and its repeater were found to be in good working order and the signal wire was correctly adjusted.

I inspected the site on 23rd February. In the course of various tests I found that the Up main distant signal No. 48 did not return to Caution when the lever in Windmill Bridge box was returned to normal. The replacing of the East Croydon North Up home signal lever did however cause it to return to Caution. A very careful investigation was made into the cause of this defect and it was found that the signal wire was abnormally tight and that the signal arm was jamming. It was stated that the wire was much tighter than it was found after the accident, and I had noticed that it had been tightened whilst I was in the box to ensure that the signal came well off. When it was re-adjusted to its normal tension, the signal worked correctly.

Conclusions

I have no doubt whatever that this accident was caused by Driver Chandler passing at speed the Windmill Bridge Junction Up main home signal at Danger after he had passed the Up main distant at Caution. Chandler could not have seen the latter signal when it was at Clear for the previous train. The Lock and Block arrangements and the interlocking ensured that the East Croydon North Up main home signal lever and the Windmill Bridge Junction Up main distant and home signal levers had been replaced to normal in the frame after that train. The distant signal arm should therefore have returned to Caution.

I am satisfied that the signalmen at Windmill Bridge Junction did not change their minds as to the precedence of the Up and the Down train over the junction. Tests were made of the times taken by the signalmen to reset the Windmill Bridge Junction and by the Down train to clear the junction, and a simple time/distance calculation based on the results proved that Chandler could not have seen the Up main distant " Off " unless his train was travelling at a speed very much slower than all the evidence suggested. The distance the train travelled after derailment indicated that the speed at the time it left the rails must have been about 40 m.p.h. Again an alteration in the precedence of the trains after the signals had been cleared for the Up train would have necessitated the use of the Sykes' release key at Windmill Bridge Junction box and the cancellation of "Line Clear" signals of which there was no evidence in any of the Block Registers.

Chandler could therefore have seen the Up main distant at Clear only if the arm stuck "Off", as it did during my tests. If I thought this was at all possible I would give him the benefit of the doubt, but I do not. During my test the arm remained " Off " when its lever in Windmill Bridge Junction box was replaced in the frame, but when the East Croydon North Up main home signal lever (which slotted the distant) was replaced the arm returned to "Caution" at once, and it should be noted that the tension in the signal wire during my test was much greater than found after the accident. Moreover, the signalman at East Croydon North saw the distant signal at Caution and commented he did not think that the train would stop at the Windmill Bridge Junction home signal.

In spite therefore of Chandler's insistence, I cannot accept his statement that he saw the distant signal at Clear. Nor can I believe that he saw the Junction home signal at Danger from a distance of about 100 yards and made an immediate emergency brake application. At that time the rear vehicle of the train had only just emerged from Windmill Bridge and the guard must have noticed such an application if it had been made. As it was, he noticed nothing amiss until the rear brake compartment had passed the home signal.

It seems most likely therefore that Chandler missed both the distant and home signals and that he did not realise anything was wrong until the train started to turn towards Victoria or possibly even until it first came off the lines.

I am unable to account for his regrettable lapse. He is 52 years old and entered the railway service at the age of 17. He became a driver in 1945 and was passed to act as a motorman in 1949. He had the normal rest before the trip and said he was in good health and had no worries. His eyes were tested last in 1951. He said he drove both electric and steam trains and found no difficulty in changing from one to the other.

Guard Smith must accept some share of the responsibility for the accident. Rule 148(*a*) of the Rule Book for British Railways requires guards to watch the running of trains carefully when approaching important junctions, as was Windmill Bridge Junction, and to "take any action that may be necessary; also to keep a good look out when leaving stations, and, as far as practicable, on other parts of the journey". If he had seen the junction home signal at Danger he could have applied the brakes and possibly stopped the train before it became derailed. I think it doubtful whether in fact he did see the distant signal.

I do not think that Signalman Carter was at fault in resetting the junction while the Up train was approaching the home signal. The Block Regulations are not specific and say that a signalman should *as far as practicable* satisfy himself that the approaching train is under control. At an exceptionally busy box such as Windmill Bridge Junction I do not think this would be practicable for an Up electric train, as the signalman would have to wait until it had practically stopped at the signal.

Remarks

This was an accident which should have been prevented by Automatic Train Control of the warning type. Before it happened all the arrangements had been made for installing colour light signalling and complete track circuiting in the area, and, as I have mentioned, the change over has since been effected. The new signals have been sited further from the facing points and as near as possible to the driver's line of sight. Colour light signals cannot be regarded as a substitute for Automatic Train Control but with their much more arresting aspects they are a great improvement on semaphore signals and should make accidents of this type less likely to occur.

I have the honour to be,
Sir,
Your obedient Servant,
D. McMULLEN,
Colonel.

The Secretary,
Ministry of Transport and Civil Aviation.