



DEPARTMENT OF THE ENVIRONMENT

RAILWAY ACCIDENT

Report on the Derailment that occurred on 28th June 1971 at Copyhold Junction near Haywards Heath

IN THE
SOUTHERN REGION
BRITISH RAILWAYS

LONDON: HER MAJESTY'S STATIONERY OFFICE

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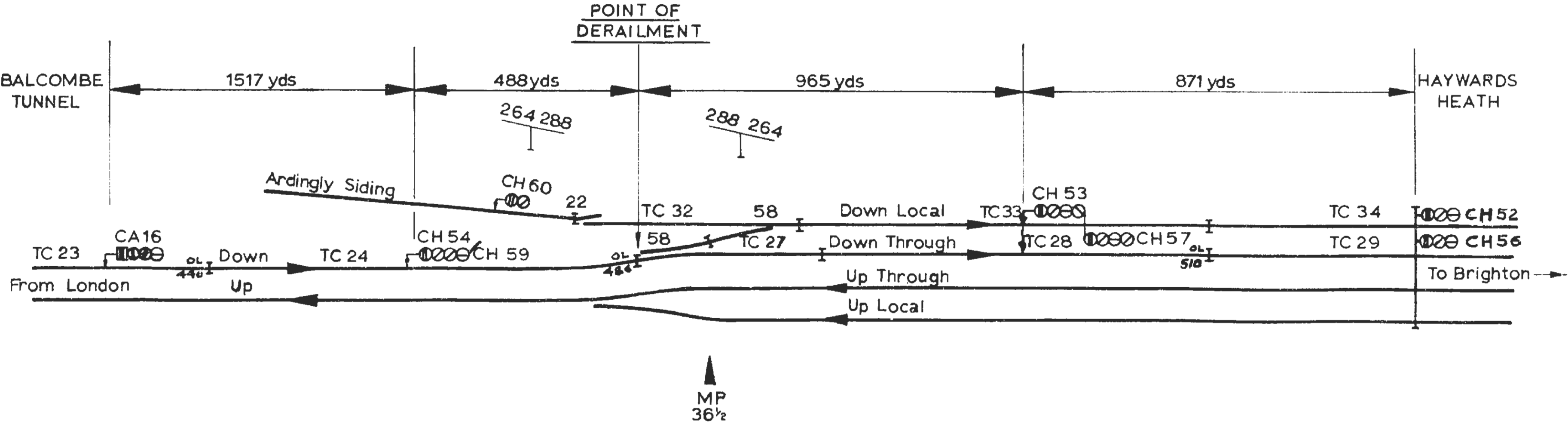
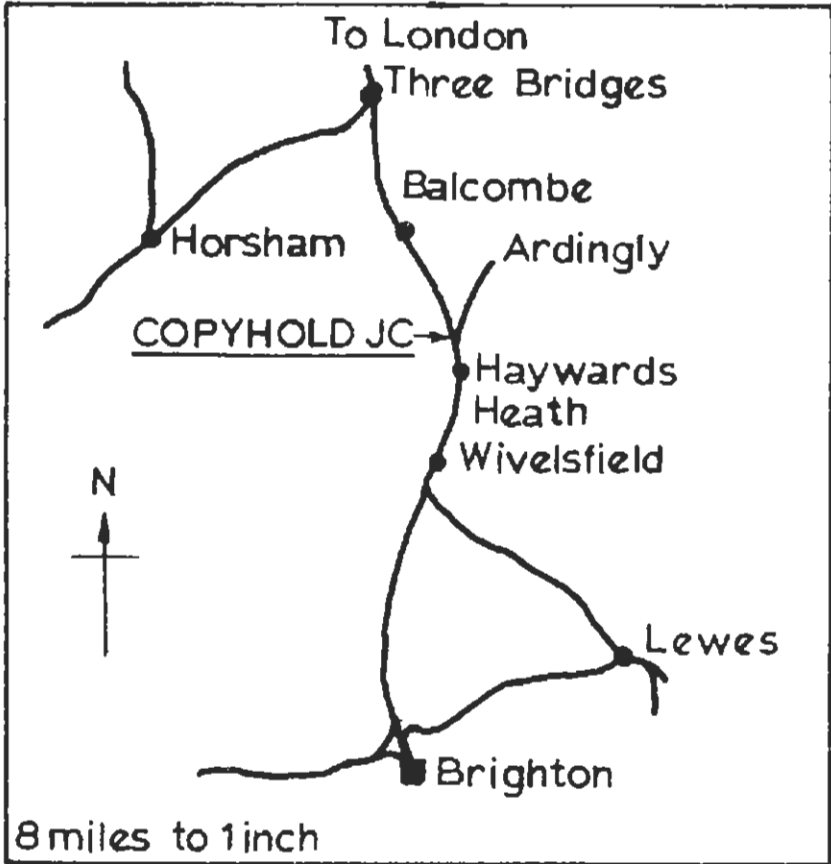
DERAILMENT AT COPYHOLD JUNCTION HAYWARDS HEATH

28th JUNE 1971

SHOWING SIGNALLING ON DOWN LINE

NOT TO SCALE

LOCATION DIAGRAM



Sir,

I have the honour to report for the information of the Secretary of State, in accordance with the Order dated 5th July 1971, the result of my Inquiry into the derailment of a passenger train that occurred at 07.19 on 28th June, 1971 at Copyhold Junction near Haywards Heath in the Southern Region of British Railways.

As the 06.41 Norwood Junction to Brighton 12-car EMU train was passing over the facing points where the Down Local line diverges from the Down Through line at Copyhold Junction, having passed the signal protecting the junction at a proceed aspect, the points moved under the leading coach, the leading bogie becoming derailed and the remainder of the train being diverted to the Down Local line.

The points were operated by the signalman at Haywards Heath who, mistakenly, thought that the train was held at the protecting signal on account of a points failure. However, the failure occurred after the train had passed the signal and had the effect of destroying the approach locking on the facing points, leaving them free to be moved under the train.

The speed of the train at the time of derailment was about 40 miles/hr. There were no casualties and only minor damage was caused to the leading coach and to the track and signalling. The weather was fine and clear.

DESCRIPTION

1. Copyhold Junction, where the former branch line to Horsted Keynes, now a single line siding serving a quarry, joins the London to Brighton main line on the Down side is $37\frac{1}{2}$ miles from Victoria and 1 mile north of Haywards Heath. Between Copyhold Junction and Haywards Heath the line is 4-tracked with Up and Down Local lines flanking the Through lines. The line speed on the Through lines is 90 miles/hr. The speed restriction through the turnout leading to the Down Local line is 60 miles/hr. The gradient is falling in the Down direction, generally at 1 in 264, from a summit at Balcombe Tunnel (MP 32) to beyond Haywards Heath. The line is electrified on the conductor rail system at 750V DC.

2. The signalling in the area is on the Track Circuit Block System with colour light running signals, installed in 1932, since when the points and signals at Copyhold Junction have been controlled electrically from Haywards Heath. Train description is by means of magazine type train describers. The signalbox at Haywards Heath, located on the Up side of the line, contains a 60-lever frame with full mechanical interlocking between the levers. Some of these operate signals and points mechanically and others, as in the case of Copyhold Junction, by electrical means. Above each of the levers controlling the colour light running signals, multiple aspect indicators are provided, displaying the actual aspect of the signal regardless of the position of the lever. In the case of points provided with electrical detection there are similar small indicator lights showing N or R as appropriate. In the event of any failure in the detection no light is shown.

3. Above the lever frame is a point and signal diagram of the layout with track circuit occupation shown by the illumination of 2 bulbs in parallel in an oval display for each separate track circuit, located and numbered appropriately.

4. Those points and signals relevant to the accident are shown on the diagram opposite. When signal CH 54 is cleared for a movement over 58 points the route is approached locked as soon as TC 23, beyond the overlap of Signal CA 18, is occupied and remains so locked until Signal CH 54 is replaced to Red by the occupation of TC 27, beyond the signal.

5. The approach locking is applied directly to the signal lever and while it is effective it is not possible to restore the lever fully to the normal position, though the aspect of the signal can be replaced to Red by moving the lever about $\frac{3}{4}$ of its stroke from the reverse position where it is held by an electric lock, thus maintaining the mechanical locking between the signal and point levers until the approach locking is released by the occupation of TC 27. The occupation of this track circuit also locks the facing points directly, thus holding the route until the train has cleared the points.

6. The 06.41 passenger train from Norwood Junction to Brighton was formed of three 4-car electric multiple units of 1963 main line stock. The leading unit, No. 7330, classified 4-CIG, comprised 2 driving trailer composites with a motor brake second and a trailer second saloon marshalled between them. The only damage it sustained as a result of the derailment was to the leading bogie on which the guard irons were bent, the shoe beams and shoe arms broken and the wheels grazed. There was no damage to the rest of the train.

7. The track in the Down Through line in the area of the derailment was CWR on concrete sleepers and the facing turnout to the Down Local line (No. 58 points) was provided with G type vertical switches of 113 lb FB rail. It was a new connection, having been laid in substitution for a slow-speed turnout some 3 months previously. The derailment caused the Down Local and Down Through lines to be slewed out of alignment and the conductor rails displaced over 150 yards; 60 concrete sleepers were damaged. Damage was also caused to the turnout switches and to an adjacent pair of adjustment switches in the Down Through line.

8. The driver of the train involved was *Driver C. Newton*. He described his journey as far as Copyhold Junction as uneventful. He received a Y aspect on Signal CA 16 and prepared to stop at Signal CH 54. He was just approaching it at 3 or 4 miles/hr and about a coach length from it when it cleared to Y, without the junction indicator illuminated, and then almost immediately to YY. He then started to pick up speed again and had reached about 40 miles/hr when he reached the junction and the derailment occurred. He immediately released the DSD and put the brake handle into the emergency position to bring the train to a stand as quickly as possible. He had not noticed the lie of the points as he approached them.

9. After informing the guard what had occurred, Driver Newton saw a train approaching on the Up Through line, so he ran forward to try and stop it since he was not sure whether the opposite line had been fouled. In fact the Up Through line was not obstructed. He then spoke to the signaller and told him what had occurred and asked him to stop traffic on the Up line. The traction current had been discharged by the derailment but he applied a short circuiting bar as an extra precaution.

10. In charge of the train was *Guard V. Muller* who was riding in the 6th coach. He had observed Signal CH 54 at Red through his periscope as the train braked on the approach to it and saw the aspect change, as described by the driver, first to Y and then almost immediately to YY without a junction indication. Shortly afterwards the train came to a stand and the driver told him over the Loudaphone that they were derailed. He checked that the opposite line was not obstructed before going back to protect his train in rear.

11. On duty in Haywards Heath signalbox at the time of the derailment was *Special Class Relief Signaller E. West*. He was 44 years of age and had 23 years experience as a signaller. He had been working regularly at Haywards Heath for 6 or 7 weeks. He had come on duty at 21.30 the previous evening and told me that he had not been kept busy through the night. There had been an Engineer's possession of the Down Local line between Copyhold Junction and Haywards Heath which had been lifted at about 05.30 and between then and the time of the derailment at 07.19 there had only been a few train movements. However, Signaller West admitted that he had not been absolutely sure about the sequence of movements and had allowed the 06.41 Norwood Junction to Brighton to be checked at Signal CH 54 while he looked up the stock working diagram to see whether a train of empty stock to form the 07.35 Haywards Heath to Scaford should be brought across from the Middle Siding to the Down Local platform before or after the Norwood Junction train. Whilst he was making up his mind which train to run first, he cleared Signals CH 54 and CH 53 to allow the Norwood Junction train to come as far as CH 52, but, shortly afterwards, he looked up and saw the indicator for Signal CH 54 showing Red, although he was sure it had shown Y when he first pulled the lever, and no indication showing on No. 58 points.

12. At this stage Signaller West admitted that he had jumped to the conclusion that, because no indication was showing on No. 58 points, he had not got detection and that the approaching train was at a stand at Signal CH 54. In this connection, the illuminated track diagram in the signalbox could possibly be misleading to the signaller because, though TC 24 extended from 1077 yds on the approach side of Signal CH 54 to within 2 yards of No. 58 points, a total length of 1563 yds, the display on the diagram was located on the approach side of the signal. Signaller West admitted that, though he well appreciated that TC 24 extended right up to the points he did not give a thought at the time to the possibility that the train could have already passed the signal when it went back to Danger. He therefore restored No. 54 lever to normal and, somewhat to his surprise, it went right back in the frame thus removing the mechanical interlocking between it and lever No. 58. Without stopping to think, he then pulled No. 58 lever to try and get a reverse indication on the points. It did not come up and, almost immediately the track circuits in the area of No. 58 points showed both Up Through and Up Local lines occupied, indicating that a derailment had occurred.

13. Signaller West's only explanation of his failure to act in accordance with the provisions of Rule 68(a) which required him not to replace the signal to Danger until the last vehicle of the train had passed the junction points was that, as far as he was concerned, the train had not passed the signal. He admitted frankly that he had not stopped to think and that, having already delayed the train, he wanted to keep it moving.

14. He could not explain why he had failed to heed the warning that should have been conveyed to him when the signal lever went right back in the frame after its having displayed a Yellow indication when it was first pulled. He admitted that, though he had never known this to happen before, he went straight ahead without waiting and reversed No. 58 points.

15. I asked Signaller West why, when the normal hours of duty for a signaller on night duty were from 22.00 to 06.00, he had signed on duty at 21.30 and was still on duty when the accident occurred at 07.19 the next morning. He told me that it was a mutual arrangement between the signallers to fit in with train timings. His relief was actually travelling on the train that was derailed and he himself would have joined it to travel to his home at Brighton. This arrangement was not officially recognised and he had not asked permission to vary the rostered hours of duty; however, such an arrangement was already in force when he came to work at Haywards Heath and he assumed that it had been agreed.

16. I then asked Signaller West what his previous turn of duty had been and what actual rest he had been able to take before coming on duty on the evening of Sunday 26th June. He told me that he had worked the previous week on the 14.00 to 22.00 shift up to Saturday evening. The actual hours he had worked each day were from 13.55 to about 21.45. On Sunday 27th June he was in the signalbox from 07.15 to 13.55 and back again on duty at 21.30 that evening. He told me it took him about $\frac{1}{2}$ hour to travel each way between Haywards Heath and his home in Brighton. He said he was in good health, had no home worries to distract him and did not feel tired. He said that, as a signaller, he was used to night work.

17. I asked *Mr. F. Paterson, Divisional Manager, Central Division*, who was present at my Inquiry, to comment on the hours of duty worked by Signalman West. He told me that in view of the critical shortage of signalmen in his Division many signalmen were having to work on their rest days and that where a signalbox was continuously open and manned by 3 signalmen without rest day relief, the alternate shift working on Sundays as described by Signalman West was designed, with the support of the railway management, to ensure that each man could have one weekend off in three. Mr. Paterson accepted that this short turnaround was not a desirable thing, but in the present situation it was a means of giving a reasonable social life to the men concerned. He stressed, however, that it was in his view absolutely vital that nothing was done to shorten the 8-hour minimum period between turns of duty and that he expected signalmen, as responsible individuals, to ensure that they took proper rest.

18. *Mr. H. L. F. Tuff, Assistant Signal Engineer, British Railways, Southern Region*, explained the nature of the failure that had allowed Signalman West to replace lever No. 54 to the normal position at a time when it should have been held by the approach locking. Because the switchblades of No. 58 points were very long and operated by means of a multiple drive, an additional point lock plunger was provided and proved in the point detection circuit. The subsequent examination had revealed a slight weakness of the spring in this detector which had presumably flexed as a result of vibration as the train approached. The inclusion of the point detection in the signal lock selection circuit for Signals 54 and 59 meant that the breakdown of the detection de-energised the signal stick relay, caused the aspect of Signal 54 to revert to Red, and so released the back lock on the lever. The normal way in which the approach locking was released was by the occupation of TC 27, a contact of the track relay for which was also included in the same circuit as the point detection, but the occupation of this track circuit would also directly lock the points, thus preventing their being moved under a train.

19. Mr. Tuff also pointed out that this method of releasing approach locking was obsolescent and, in a modern installation with route relay interlocking, the release would be a much more sophisticated one, requiring the occupation and clearance of one track circuit and the occupation of a second. In this way the approach locking would not be destroyed by an individual track circuit failure or by the failure of the detection on a pair of points.

20. I asked *Signal Technician E. K. Dudeney*, who was responsible for the maintenance of the signalling equipment at Haywards Heath, whether the detection on No. 58 points had given any trouble during the period between the new points being installed and the date of the derailment. He confirmed that he had some difficulty obtaining a satisfactory adjustment of the detection on the additional point lock plunger. This had resulted, on a number of occasions, in the signalman being unable to get detection on the points and hence being unable to clear his signals. However, Mr. Dudeney assured me that, during the 13 years in which he had been in the area, he had never known of a failure that had released the approach locking in this way. A number of cases had occurred in which the signal had changed in aspect from Green to Red, but in each case the cause was a failure of TC 27, showing occupied when it should have been clear.

21. *Mr. W. R. Tubb, Area Signal Manager, Redhill* told me that the signalling in the area for which he was responsible, including the stretch of the Brighton Main line from Coulsdon North to Hassocks was generally similar to that at Haywards Heath. He had found the system of locking reliable and easily maintained and, though they did experience a number of track circuit failures these were safety side failures and, he was unable to instance to me any previous danger side failure of the kind that occurred at Copyhold Junction.

CONCLUSIONS

22. This derailment, which fortunately had no serious results, was directly caused by the actions of the signalman on duty in Haywards Heath at the time, who reversed No. 58 points as the leading coach of the train was passing over them. He must have moved the point lever immediately before the train reached the points, but the switchblades had not started to move when they were held by the leading wheels which continued straight ahead. The switchblades then moved between the bogies of the leading coach and the rest of the train was diverted to the Down Slow line. Had he moved the lever a moment earlier, the whole train would have passed without derailment on to the Down Slow line; a moment later the lever would have been locked by the occupation of TC 27.

23. The signalman was able to move the point lever because he had restored the signal lever which locked it mechanically. This he should not have been able to do if the signalling equipment had been in proper order because it should have been held by the approach locking. The approach locking, however, had been prematurely destroyed by a momentary failure which occurred some time after the train had passed Signal CH 54.

24. The premature release of the approach locking could be regarded as a danger side failure but it was not one which, in itself, could cause an accident. The signal and point levers concerned were mechanically interlocked and the position of the approaching train was indicated on the signalbox diagram. The signalman, in restoring the signal lever before the train had cleared the junction points, had failed to observe Rule 68 (a) (i) of the British Railways Rule Book, 1950, and then, having deprived himself of the protection afforded by the mechanical interlocking, attempted to move a pair of facing points when there was a train in the vicinity. He must bear the responsibility for the consequent derailment.

25. It is difficult to understand why such an experienced signalman did not realize something was wrong when, having seen the aspect indicator for signal CH 54 show Y when he first pulled the lever, he found that the lever went right back in the frame when he restored it. The first reaction of a man who was fully alert would

have been to establish where the train was before attempting to reset or alter the route and, despite Signalman West's insistence that he was not tired, I take the view that the effect of the alternate shift working that he had carried out over the preceding weekend had been to blunt his faculties to the extent that he did not react as he should have done when a possibly hazardous situation presented itself. Since leaving home the previous morning he had spent 16½ hours on duty in the signalbox, 2½ hours travelling and barely 6 hours at home to cover food and rest and I have little doubt that, despite his own assurances, he was insufficiently rested before he came on duty on the Sunday evening.

26. In view of the statement made at my Inquiry by Mr. Paterson on the shortage of signalmen, I asked him to let me have further details of the position as far as his Division was concerned. He provided me with a comprehensive statement which showed that there were 117 vacancies out of an establishment of 536 signalmen and that full rest days were only being taken at 3 signalboxes out of a total of 132 in the whole Central Division. Approximately half rest days were being taken at 25 signalboxes, a quarter at 12 signalboxes and none at all at no less than 83 signalboxes, including Haywards Heath. In addition to the above there were 9 signalboxes at which 12-hour working was more or less continuous. He assured me that he was making special efforts to recruit more men into the signalling grade and that some limited degrees of success had been achieved. Nevertheless it seems likely that the general picture will not change significantly until the introduction of new power signalboxes has the effect of reducing the overall requirement for signalmen.

27. I accept that, where rest day relief signalmen are not available, the alternate shift working at weekends is a necessary arrangement if the men concerned are to have any sort of social life but, wherever it is adopted, it is absolutely essential that the intervening off-duty periods are not eroded by unofficial local arrangements to the extent that the signalmen do not have time to take proper rest. In cases where, as at Haywards Heath, signalmen have to use the rail service to travel to and from work and it is not convenient to work the standard 8-hour shifts, I recommend that the actual hours to be worked should be reviewed by the Area Manager who should personally ensure that adequate rest periods are provided between successive turns of duty.

I have the honour to be,

Sir,

Your obedient Servant,

J. K. A. McNAUGHTON

Lieutenant Colonel.

The Permanent Secretary,
Department of the Environment.