G.R.S. Wilson 14

# LONDON MIDLAND AND SCOTTISH RAILWAY.

MINISTRY OF TRANSPORT,
Metropole Buildings,
Northumberland Avenue,
London, W.C.2.

21st January, 1938.

SIR,

I have the honour to report for the information of the Minister of Transport, in accordance with the Order of 12th November, 1937, the result of my Inquiry into the accident which took place at about 11.22 p.m. on 10th November, at Euston Station, on the London Midland and Scottish Railway.

Through a misunderstanding between signalmen, a train of empty carriages which was to form the 12.40 a.m. train to Glasgow (St. Enoch), was turned into No. 15 platform line instead of into No. 13. The former platform was occupied by the coaches of the 11.45 p.m. train to Glasgow (Central), with which the incoming train collided at 10-15 miles an hour. Many passengers had already taken their places in the 11.45 p.m. train, and 20 received injuries, necessitating detention in hospital for a day in three cases and hospital treatment in seven others. In addition, three Company's servants at work in the stationary train were injured, one seriously.

All the injured were dealt with expeditiously, the first ambulance leaving the station about 15 minutes after the accident. Assistance was given to the injured by a Glasgow doctor who was a passenger in the 11.45 p.m. train and by members of the Company's staff trained in first aid work.

The night was fine, with a little mist.

## *Description of Site and Signalling.*

2. The 15 terminal platforms at Euston are numbered from east to west, and Platforms 12 to 15 are used for the departure of long-distance trains; the 11.45 p.m. train was standing at the most westerly, No. 15, with the engine which had drawn it into the station about ten feet away from the buffer stop. There was no engine at the country end of the train, which occupied the whole length of the platform; the collision took place at the platform ramp. The lines entering the station run in cutting, between retaining walls, and pass below three overbridges, fairly close together. Due to the bridge piers, and to a reverse curve, the driver of a train entering No. 15 platform does not get a good view of vehicles standing near the platform ramp, which is some 20 feet south of the nearest bridge.

North of the station there are four lines used for passenger traffic; other running lines and sidings, east and west of the passenger lines, are used for the movement of light engines and empty trains, and for stabling. The incoming train had been made up at Willesden and approached the station on No. 1 Up Engine Line, situated immediately west of the passenger lines; as its name indicates, the line is also used by light engines running to the station from Camden locomotive depot.

3. In order from north to south, the signal boxes concerned are Euston No. 4, Euston No. 3, and Euston No. 2. The first-named controls traffic over both the passenger and the non-passenger lines, including No. 1 Up Engine Line. Euston No. 3 box controls movements over the non-passenger lines only; it is staffed by one man, and has an all-electric frame of 52 levers. Euston No. 2, at the country end of the station, is a large box controlling all inwards and outwards traffic. It has two mechanical frames containing 288 levers in all; three men were on duty at the time of the accident.

A train entering the station from No. 1 Up Engine Line passes the following signals in the order named:—

(A) Euston No. 3 box home signal.

(B) A group of four signals, worked from Euston No. 2 box, carried on a gantry. Of these, the second from the left leads to Platform 13 and a middle road, while the third from the left leads to Platforms 14 and 15, and to engine sidings west of the station.

(C) A dwarf signal worked from Euston No. 2 box, having two arms, of which the lower leads to Platforms 14 and 15, and to the engine sidings, and releases the corresponding arm on the signal gantry.

Measured along the line on which the incoming train arrived, which is about 33 yards away from No. 2 box, the approximate distances from the point of collision to the signal boxes and signals mentioned are:—

| | *Yards.* |
|---|---|
| Point opposite Euston No. 2 box ... ... | 50 |
| Dwarf signal (C) ... ... ... ... | 120 |
| Signal gantry (B) ... ... ... ... | 212 |
| Euston No. 3 box ... ... ... ... | 313 |
| Euston No. 3 home signal (A) ... ... ... | 335 |
| Euston No. 4 box ... ... ... ... | 767 |

Block working is in force over No. 1 Up Engine Line between the three boxes named, and 3-position instruments of the usual type are in use. The standard bell code is used, except that "Train entering section" is not sent from No. 3 box to No. 2, on account of the short intervening distance. When a train or engine is accepted by No. 2 box, it is allowed to draw forward as far as the signal gantry.

*Description of Trains and of Damage to Rolling Stock.*

4. The stationary train consisted of 13 bogie coaches, 8 of which were sleeping cars. The engine which had drawn it into the platform, and was standing close to the buffer stop, was of the "Royal Scot" 4-6-0 type, weighing with its tender about 139 tons in working order; with the engine the train weighed about 600 tons.

The incoming train also consisted of 13 bogie coaches, 4 of which were sleeping cars. It was drawn by a 2-6-4 type tank engine weighing 86 tons in working order, running chimney first; including the engine, its total weight was about 498 tons.

All the coaches of both trains had steel underframes and were fitted with shock absorbing buffers. In the stationary train the brake vans at either end had all-steel bodies, and the remaining vehicles had wood-framed bodies, panelled with steel wholly or in part. The second, eighth, and thirteenth vehicles of the incoming train were brake vans with all-steel bodies; of the remainder, three (third, eleventh, and twelfth from the engine) had wooden bodies, while the rest had wooden framed bodies, with steel panels.

5. The collision drove the engine of the stationary train into the buffer stop, which it forced back into the masonry of the platform for 20 inches, the front end of the engine sustaining superficial damage. There was no derailment, but all the coaches were damaged. Throughout the train the carriage bodies were strained, badly in several cases, and there was considerable breakage and displacement of internal fittings, such as mirrors and wash basins in the sleeping cars. A few windows and ventilating lights were smashed, but the damage to bodywork in general was not such as to cause serious personal injury. With regard to the underframes and running gear, several axleboxes were broken, some of the bogies were slightly displaced, and a few of the vehicles had headstocks or solebars bent; the buffing and drawgear resisted the shock well.

With regard to the incoming train, the front end of the engine was slightly damaged. Buffer locking between the coaches occurred in three places, and 11 pairs of wheels left the rails, no doubt due to the fact that at the moment of impact the train was on a reverse curve and moving over points and crossings. As in the stationary train, damage was fairly evenly distributed throughout the 13 coaches, only two, ninth and tenth from the engine, escaping entirely. The rest all had their bodies strained, some badly, and there was some breakage of internal fittings, though less extensive than in the other train. Several headstocks and a few solebars were bent, and some axleboxes were broken; there was rather more damage to the buffing and drawgear than in the stationary train, due to the buffer locking which took place.

*Report.*

6. Before dealing in detail with the circumstances which led up to the accident, with regard to which there was no dispute, except on one point, the method of working empty carriage trains and light engines into the station may be described. Although these trains and engines leave their starting points, Willesden carriage sidings and Camden engine shed respectively, in a predetermined sequence, the order in which they reach the station is apt to vary. Empty trains from Willesden travel over the main line for a part of their journey, and consequently run at scheduled times, but, for a variety of reasons, the times laid down for the departure of engines from the shed sidings are less rigidly observed. Hence from Euston No. 4 box, where the empty trains and light engines converge on to No. 1 Up Engine Line, to No. 2 box, where they are directed to the appropriate platform, an empty train may on one day precede and on another follow the light engine booked to work a particular down train; in addition, a train or engine running on No. 1 Up Engine Line may be held at No. 3 box to allow a train from the stabling sidings to precede it along that line into the station.

It will be appreciated that if empty trains reach the station in their *own* proper sequence, and light engines do so likewise, no uncertainty arises regarding their disposal, even though the *relative* order of empty trains and light engines varies, so long as the signalman in No. 2 box who deals with movements into the departure side of the station learns by the block bell signal from No. 3 box whether an empty train or light engine is approaching. In this connection it should be mentioned that the "Is line clear" signal for an empty carriage train as well as that for a light engine is given by five beats on the block bell, sent as 2 pause 2 pause 1 in the former case, and as 2 pause 3 in the latter.

7. When an engine is about to leave the engine sidings at Camden, particulars of the train which it is booked to work are telephoned by the fireman to No. 4 box. In normal circumstances, that is to say, if engines are leaving the shed in the proper sequence, these particulars are not passed on by telephone to the signalman at No. 2 box who will have to deal with the engine later. The reason for this was explained by Signalman Hill, who was in charge of No. 4 box when the accident occurred. He said that it was sometimes difficult to attract the attention of the signalman concerned in No. 2 box, and that, apart from this, the telephone line was often in use for other purposes, as it serves six instruments; consequently it has been arranged, between the signalmen themselves, that light engine movements are not notified to No. 2 box unless they do not conform to the prearranged programme. Hill stated that in such a case he would send the information to one of the other signalmen in No. 2 box, using another telephone for the purpose, if he could not get into touch promptly with the signalman dealing with the departure side of the station on the omnibus telephone circuit mentioned.

With regard to the discrepancy between the booked and actual starting times of engines from Camden, Hill thought that this was usually of the order of five minutes either way, although he had known engines to leave as much as 20 minutes early or 10 minutes late. He said that in normal circumstances, that is to say, if both were punctual, the empty carriages to form the 12.40 a.m. train would run to the station ahead of the engine to work the 11.45 p.m. train, but that occasionally they ran in the reverse order. He thought that on the night of the accident the engine must have left the shed at about the correct time, for when it reached his box he had already heard that No. 1 Up Engine Line was blocked by the collision, and consequently had to send the engine to the station by another route.

8. Signalman Lambert was in charge of No. 3 box, where he has been employed for eight years. He stated that the train of empty coaches to form the 12.40 a.m. train was correctly described, by the 2-2-1 bell signal, when it was offered to him from No. 4 box. He offered it to No. 2 box by the same bell signal, and was certain that he sent the signal properly, and also that it was correctly repeated to him almost at once from No. 2 box, indicating that the train had been accepted; if the signal had been incorrectly repeated, he said that he would have sent it a second time, to draw attention to the fact that the first signal had been misunderstood. Lambert was not particularly

busy at the time; there were no outward movements from the station in progress, and he had dealt with only two inwards movements during the five minutes prior to the passage of the empty train.

9. Signalman Archer was working at the north end of No. 2 box, and dealing with movements from No. 3 box towards the departure side of the station; he has worked in the same box for six years. He knew that the 11.45 p.m. train was standing, waiting for the train engine, in its usual platform, No. 15, and that the 12.40 a.m. train also was to start from its usual platform, No. 13, which was unoccupied. He was positive that the " Is line clear " signal, which he received on the block bell from No. 3 box in respect of the empty carriage train, was 2 beats, followed by 3 beats not separated by a pause, i.e., that it was the appropriate bell signal for a light engine.

He said that he had no difficulty in hearing the signal, for though there was some shunting in progress, entailing shouting between one of the other signalmen and the shunter, he himself was unoccupied at the moment and was close to his block instruments; so far as he could recollect, no bell signals were being exchanged on the other block instruments in the box just then. The other two signalmen were working some little distance away, and were engaged on other duties; neither of them noticed the bell signal in question.

Archer concluded from the bell signal that the engine to work the 11.45 p.m. train was approaching, as it was the next one due to arrive from Camden, and he therefore set the road into No. 15 platform and lowered the appropriate signals (dwarf signal C and gantry signal B), after which he acknowledged the " Is line clear " signal; he was certain that he sent this acknowledgment as 2-3 beats. He then looked out for the arrival of the engine, and realised that a mistake had been made as soon as the headlights came into sight, below the northernmost of the three bridges mentioned. He said that it was then too late for him to do anything to stop the train, for it had already practically reached the dwarf signal (C); he had no time to reach his hand lamp, but tried to attract the driver's attention by shouting, without success.

10. Archer confirmed Signalman Hill's statement that use of the telephone between No. 4 and No. 2 boxes to notify light engine movements is confined to occasions when these are out of course. With regard to Hill's remark that sometimes it was difficult to get an answer to the telephone from No. 2 box, Archer said that the bell occasionally rang unnoticed, owing to the noise often made by engines standing near the box, and to the signalmen having to spend part of their time at the windows supervising shunting movements. He thought it might be of some assistance if an indicator were provided to show when the bell had rung, but would greatly prefer a direct circuit between the two boxes (Nos. 2 and 4) for notifying light engine movements. He said that the omnibus circuit now employed for this was much used for other purposes, notably for messages between the carriage shed and the Marshalling Inspector.

With regard to the possibility of confusion between the " Is line clear " signal for a light engine and that for an empty train, Archer said that this did occur occasionally. He recollected two similar incidents, the more recent of which took place, he thought, about eight weeks previously, though he himself was not concerned in it. Signalman Lambert (No. 3 box) had a clearer recollection of it, and said that it occurred on 30th September, but had no untoward consequences.

11. Driver Hayward, of the empty carriage train, said that he had been employed on similar work for a considerable time. Though he knew that the 12.40 a.m. train usually started from No. 13 platform, he was not surprised to find the signals lowered for him to run into No. 15, as the allocation of trains to platforms is sometimes changed at short notice by the station staff; he thought that such an alteration had been made on this occasion, for he knew that there had been a minor dislocation of the station working earlier in the evening. He was driving from the left side of the footplate, and said that owing to the curve he saw nothing of the stationary train as he entered the platform, but that his fireman called out to him to stop when he was close to it. He added that his speed at the time was that at which he usually entered the station with an empty train.

Hayward's fireman, Bolton, saw the stationary train by the light of the platform lamps as the engine was passing below the bridge at the entrance to the station. Both he and Hayward thought that there was no tail light on it, but Hayward said that even if there was one, their view of it would have been limited to a few yards by the curve and the bridge piers, and that he could not have stopped after it became visible in time to avoid the collision.

Other evidence suggested that there was a tail lamp on the stationary train, however. The coaches composing it had come from Willesden, and, according to Inspector Rhodes, the tail lamp used for that journey was still in position, and giving a good light, when he walked along the train computing its tonnage about 10 minutes before the accident. Also, the stationmaster, Mr. Harrison, stated that the tail lamps of empty trains normally remain in position until removed either by the fireman attaching the engine or by the porter appointed to examine doors, etc., on the side away from the platform; the latter had not reached the head of the train when the accident occurred.

*Conclusion.*

12. I do not regard Driver Hayward as responsible for the collision in any way; his assumption that an alteration in the station programme had been made was a natural one, and the statement that the view obtainable of the stationary train was insufficient to enable him to stop clear of it may be accepted.

It is clear that the accident came about through misinterpretation of the block bell signals on the part of the signalmen at Nos. 2 and 4 boxes, Archer and Lambert respectively. Their statements regarding the form in which these bell signals were sent and received are in direct conflict with one another, and in the absence of independent evidence it is not possible to determine which of them was at fault, or whether both are to blame. While the manner in which the bell signals were transmitted must remain a matter of surmise, I am inclined to think that Lambert must originally have sent the 2-2-1 " Is line clear " signal a little carelessly, not marking the second pause clearly enough, and so leading Archer to interpret the signal as 2-3. But this in itself would not have led to the accident unless Archer in turn repeated the supposed 2-3 signal in such a way as to lead Lambert to think that the acknowledgment was in the form 2-2-1. Admittedly Lambert was anticipating that the acknowledgment would be in that form, but I imagine that he would have noticed that a mistake had been made if the cadence of the last three beats had been perfectly regular; hence the possibility that Archer sent the 2-3 bell signal without due care cannot be dismissed.

I therefore consider that the responsibility for the accident must be shared by Signalman Lambert and Signalman Archer, but I am not in a position to apportion the blame between them. Both men are thoroughly experienced; they have worked for eight and six years respectively in the boxes concerned, and have good records.

*Remarks and Recommendations.*

13. The occurrence illustrates the need for precision in the transmission of block bell signals, and I am sure that this lesson will not be lost upon the men concerned. There is, however, another feature to which I think it desirable to draw attention. Several of the " Is line clear " signals in the standard code, including those for light engines and for empty carriage trains, consist of five beats, variously sub-divided by pauses to differentiate between the classes of train to which they refer. Confusion between these signals is bound to occur at times, especially if care is not exercised in sending them; the practice of acknowledgment by repetition is not an absolute safeguard, as the present case shows, for the man who originates the signal expects to have it repeated to him in the same form, and so may occasionally be predisposed to accept as accurate an incorrect repetition.

In general, this entails no particular risk; it would lead to the signalman at the forward box finding, when the train arrives, that it is of a class different from that which he expected, but normally nothing more serious than delay, or some dislocation of traffic, would result. But at the entrance to a terminal station the conditions are different, for, as in the present case, a mistake in the bell signals may lead to a train being turned into a platform where there is only room for a light engine.

14. Steps have now been taken to prevent such a misunderstanding occurring in the future at Euston, by the adoption of a special "Is line clear for light engine" bell signal, for use between Nos. 3 and 2 boxes. The introduction of a distinctive signal for this purpose should prevent a recurrence of the accident, and the question might well be considered in relation to other places where the conditions are similar.

At the time of the Inquiry a final decision had not been made as to the form which the special signal should take, and a code of two beats on the bell was in use tentatively; normally this signifies "Train entering section," but, as mentioned earlier, that signal is not sent for movements between the two boxes in question. The signalman on duty in No. 3 box at the time suggested, in this connection, that the adoption of two beats for the special light engine signal might perhaps cause confusion in No. 2 box, where the "Train entering section" signal is used for movements over the passenger lines to and from No. 4 box; I was informed that this point would receive consideration.

15. In this particular instance the misunderstanding which led to the accident would probably have been avoided if it had been the practice to notify No. 2 box by telephone of the movement past No. 4 box of *all* light engines on their way to the station, for the engine to work the 11.45 p.m. train had not reached the last-named box when the collison took place. But I do not consider that the arrangement whereby such telephone messages are restricted to cases in which engines leave the shed out of course should necessarily be condemned on that account. Some sidings used for stabling trains, and leading from the Down side carriage shed, join No. 1 Up Engine line at No. 3 box. It often happens that engines or empty trains arriving there from No. 4 box are held back while movements towards No. 2 box and into the station from these sidings take place; hence information whether an empty train or a light engine is approaching can only reach the signalman at No. 2 box by means of the block bell signals exchanged with No. 3 box, and any telephone message from No. 4 box can only be supplementary thereto. Nevertheless, having regard to the relatively short distance—little more than 700 yards—between Nos. 2 and 4 boxes, it is undesirable that such telephone messages, when they become necessary, should be delayed by having to pass over a fairly busy omnibus circuit, and I think the Company should be asked to consider the advisability of providing a direct line for the purpose between these boxes.

16. I noticed that at No. 3 box the block bell keys are placed unusually high; the two used to communicate with No. 2 box are about 6 ft. above floor level, while in the case of those forming part of a pair of block instruments connected to No. 4 box the height above the floor is no less than 6 ft. 8 ins. Though Signalman Lambert made no mention of this, it would appear that a man of medium stature may have some difficulty in handling with the necessary precision bell keys fixed at such a height; I recommend that the Company be asked to consider the practicability of lowering them.

17. The question naturally arises whether an accident of this nature could not be prevented by some modification of the signalling arrangements. In this connection it should be noted that even if information that No. 15 platform was occupied had been given to Driver Hayward by the lowering of a calling-on arm, had one existed, this would almost certainly have been interpreted by him as an indication that there were one or two vehicles standing against the buffer stops; in such circumstances he would have entered the station at his usual speed, never expecting to be turned into a platform occupied for its full length, and the accident would still have taken place.

The only arrangement that would be effective in the circumstances narrated is the provision at the entrance to the station of signals having three "Proceed" aspects, one indicating that a platform line is clear up to the buffer stops, the second that it is occupied for a portion only of its length, and the third that it must be entered with extreme caution, e.g. when there is only room for an engine to back on to its train. The present mechanical signalling installation at Euston has been in existence for many years, and I hesitate to suggest any alteration to it, as plans for the reconstruction of the station are being actively considered. But I consider that when the alterations take place the above principles should be followed, as they have been at other terminal stations where the signalling has been modernised lately.

18. I think it appropriate also to remark on the behaviour of the shock absorbing buffers with which both trains were equipped. The damage to the coaches, instead of being concentrated near the point of impact, and of a serious nature there, was distributed fairly evenly throughout the two trains and was nowhere great enough to cause severe personal injury. To some extent this was doubtless due to the fact that the 26 coaches were of more or less uniform construction and weight, but the incident shows the value, especially where low speed collisions are concerned, of the modern type of buffers fitted to them, having large faces and springs arranged to give graduated resistance.

I have the honour to be,

Sir,

Your obedient Servant,

E. WOODHOUSE,

Lieut.-Colonel.

The Secretary,

Ministry of Transport.

(47715—54) Wt. 3562—3222 625 2/58 P. St. G. 379/13