LONDON AND NORTH EASTERN RAILWAY

MINISTRY OF WAR TRANSPORT,
Berkeley Square House,
London, W.1.

15th March, 1944.

Sir,

We have the honour to report for the information of the Minister of War Transport, in accordance with the Order dated 17th January 1944, the result of our Inquiry into the collision which occurred at about 7.20 p.m. on Sunday, 16th January 1944, at Ilford Station Up Through platform, about 7 miles from Liverpool Street, on the London and North Eastern Railway.

In darkness and dense fog, the 2.40 p.m. express passenger train from Norwich to Liverpool Street passed a succession of signals at danger, and collided, at a speed of 20 to 25 m.p.h, with the rear of the 2.38 p.m. express passenger train from Yarmouth, which was about to restart on instructions from the signalman after a stop at the box. The fogsignalmen had been called out, but had not arrived at the Up line posts.

There was considerable damage to both trains, which were crowded, and it is regretted that 9 passengers lost their lives, including 3 members of the U.S. Forces. In addition 28 passengers, including 12 members of the U.S. Forces, had to be detained in hospital, and 10 others complained of shock or minor injuries. The guard of the Norwich train suffered from shock, and had a narrow escape when the leading van in which he was riding was telescoped. The two enginemen of this train were unhurt, as was the guard of the Yarmouth train who also was travelling in front.

The rescue work was facilitated by the presence of the platform alongside, but extrication of the injured proved difficult in the darkness and fog in spite of the assistance of flare lights. Immediately after the collision, first aid to the injured was given by an American doctor and nurse who were passengers in the Yarmouth train, and by an ambulance trained member of the Company's staff. In response to a general call for assistance, Ilford Civil Defence personnel arrived at 7.36 p.m. followed by their rescue squad at 7.50 p.m; the first ambulance, with a doctor, also arrived at 7.50 p.m., and the first of the injured left for King George V hospital at 8.10 p.m. Six more doctors arrived at 8.15 p.m., and the last of the casualties was removed at 9.20 p.m.

The Police and the National Fire Service were also in attendance, the latter for general assistance as there was no fire. The relief work in all its branches was prompt and efficient, and credit is due to the organisations concerned as well as to local doctors and to passengers and members of the public who helped. Special mention should be made of the services rendered by a medical detachment which was sent from a neighbouring depot of the U.S. Army.

The Yarmouth train comprised nine 8-wheeled bogie coaches and one 2-coach articulated set, weighing 339½ tons. It was hauled by engine No.2868 of the B.17 4-6-0 type, driven from the left hand side and weighing 129¼ tons in working order with tender. The combined weight was thus approximately 469 tons and the total length was 235 yards. The Norwich train was formed of ten 8-wheeled bogie coaches and one 2-coach articulated set, weighing 367 tons. The engine was No.8564 of the B.12 lighter 4-6-0 type, driven from the right hand side and weighing 107¼ tons in working order with tender. The combined brake power was approximately 73% of the total weight of 474¼ tons, and the total length was 259 yards.

The bodies of all the 23 vehicles were of hard wood; their underframes were composed of heavy steel sections except for the timber headstocks of 5 passenger coaches and 1 van, which were of older type. Couplings were mixed screw and Buckeye, and there was electric lighting throughout.

The engine of the Norwich train penetrated the last coach (a corridor composite) of the Yarmouth train for about half its length, smashing the timber headstock, and driving the steel solebars apart; the body was almost completely demolished, and the roof and sides were separated from the underframe. The

next coach ahead, an open third, was partially overturned to the right, and its rear end was thrown to the right foul of the adjacent Down Through line as the screw coupling parted. The all-steel frame was bent and there was considerable damage to the undergear; the rear vestibule was crushed in, but otherwise the body was almost intact. The Buckeye coupling held fast with the coach ahead, which, with the next 3 coaches, suffered no serious damage. The engine and the first 5 coaches were undamaged, and went forward with their passengers at 8.55 p.m.

The engine of the Norwich train was not derailed, and eventually went back to the sidings under its own steam. The buffer beam was severely distorted and the main frames buckled at the front end, with other superficial damage. There was no telescoping between the leading van and the tender, which was undamaged, but the van and the following vehicle, a corridor first, which were screw coupled were telescoped together for about half their length, with corresponding destruction to their bodywork. The remaining vehicles were neither derailed nor seriously damaged.

Both the Through lines were blocked, but the Local lines were not affected, and with the convenient crossover facilities there was little effect on traffic. The breakdown crane work was somewhat hampered by the station umbrella roofing, but rapid progress was made with the arrival of daylight; there was only slight damage to the permanent way, and normal working was resumed at 2.30 p.m. on Monday 17th January, after a lapse of a little over 19 hours.

Dense fog had persisted all through the previous (Saturday) night and during the Sunday until between 1.0 p.m. and 2.0 p.m, when it cleared and the sun came out. The fogsignalmen were then dismissed, but between 6.30 and 7.0 p.m. the fog descended again, if anything worse than before, and the fogmen were recalled from their homes. Although there was no undue delay, and some men had arrived, it was unfortunate that none of the Up Through posts had been manned when the accident took place. By all accounts, visibility in the neighbourhood at the time was limited to a few yards; it has been stated that, for its effect on traffic, this was the worst fog the country had experienced during the last 4 years.

D E S C R I P T I O N

1. Approaching Ilford in the Up direction from the East, this four-track main line runs through a suburban area for some miles, with short signalling sections. Curvature is comparatively slight, and the gradient falls at about 1 in 400, following the steeper descent from the Brentwood summit (3 miles at 1 in 100), some 10 miles further back. For the last few hundred yards approaching Ilford Station the line is in cutting with retaining walls, but otherwise there is not a great deal of cut or fill. The attached line diagram shows the signalling arrangements for the last 2 miles, and other relevant information, including the signal aspects which were displayed for the Norwich train.

2. Sykes Lock and Block is in force throughout, pending the installation of colour-light signalling and continuous track circuiting as an integral part of the Liverpool Street - Shenfield electrification, the completion of which was deferred on the outbreak of war. Briefly, the Sykes electro-mechanical controls ensure that, once the signal box plunger has been actuated to free the section signal of the box in rear, it cannot be used for a second acceptance until the first train has passed through the section and has operated a rail contact in advance of the clearing point, and the signal levers have been pulled and replaced in their proper sequence. An acceptance plunge also proves the distant arm at Caution.

3. With reference to the diagram, the Up Through semaphore signals D, E, and F are fairly high, viz. 25 ft. to 33 ft. above rail level, and it is doubtful whether their oil lights would have been visible from the footplate under the prevailing conditions; it will be noted that their fog posts, which were not manned, are all situated to the right of the Up Through line. None of the signal boxes concerned is equipped with emergency detonator placers.

The multi-lens colour-light signals A, B, and C, which were the key to the situation, are sited to the left of and close to the Up Through line, and are of standard height, viz. practically level with the driver's eye; their lights have double filament bulbs, the secondary filament being brought into use automatically if the main filament fails. They were installed in their final positions under the electrification and re-signalling scheme when the track layout at Seven Kings was remodelled recently in the course of ordinary renewals, and Seven Kings East box was abolished; they were brought into use on 24th October and 19th December, 1943 (see Appendix I for extracts from the relevant notices). Signal C replaced a semaphore signal fitted with a co-acting detonator placer, which was removed.

For the time being these three signals are not controlled by track circuit, and are operated by their respective levers in Goodmayes West and Seven Kings boxes; in fact they act as colour-light equivalents of semaphore signals, as shown in detail by the diagram. The electrical circuits provide for the usual sequence of aspects, in accordance with the following table:-

	A.	B.	C.
Condition	Goodmayes West Up Through Home	Seven Kings Up Through Outer Home	Seven Kings Up Through Inner Home
Goodmayes West Up Through Home Lever reversed	Y	R	R
Seven Kings Up Through Outer Home Lever reversed	Y *	Y *	R
Seven Kings Up Through Inner Home Lever reversed.	G	YY	Y
Ilford Carriage Sidings Up Through Distant Lever rev.	G	G	G

* Seven Kings Up Through Outer Home cannot be seen from Goodmayes West Up Through Home.

4. With the Sykes controls, signal C cannot be changed from RED unless its lever in Seven Kings box has been freed by an acceptance from Ilford Carriage Sidings; nor can it be better than YELLOW unless the Ilford Carriage Sidings starting signal has been freed in turn by an acceptance from Ilford East. The controls also ensure that Seven Kings cannot plunge to accept from Goodmayes West unless signals B and C are at RED, with the track circuit clear and signal A also at RED. Similarly, acceptance by Goodmayes West requires signal A at RED, and the semaphore distant at Caution.

Repeaters are provided in Goodmayes West box for signal A, in Seven Kings box for signals A, B and C, and in Ilford Carriage Sidings box for signal C; they are of ordinary type, showing "ON" for the RED aspect and "OFF" for YELLOW, DOUBLE-YELLOW, and GREEN, in the case of the stop signal levers. For the distant signal levers, the repeaters show "ON" for the RED and YELLOW aspects, and "OFF" for GREEN.

5. Block Telegraph Regulation 4(d) requires "double block" working in fog when the fog posts are not manned, as was the case on the Up Through line; i.e. acceptance from the box in rear is prohibited unless "Train Out of Section" has been received from the box in advance for the previous train. Seven Kings box is exempt from this provision, in view of the above mentioned colour-light signals.

Further, owing to the very short section between Ilford East and Ilford West, the former is not authorised to give "Train Out of Section" to Ilford Carriage Sidings, even in clear weather, until the train has operated

rail contact H ahead of the Ilford West starter, to free the (Ilford East) plunger for a following acceptance.

6. The circuits of the colour-light signals and of their repeaters were tested on the morning after the accident and found to be in order; all the lights responded correctly to their controls, with the main filaments intact.

REPORT

7. In addition to the Yarmouth and Norwich trains directly concerned, there was a train from Clacton which preceded the former from Colchester onwards. The Clacton and Yarmouth trains were both booked non-stop from Shenfield to Liverpool Street; the Norwich train was booked non-stop for the whole journey from Ipswich, 69 miles in 95 minutes, representing an average speed of 43.6 m.p.h. It left Ipswich at 5.27 p.m., 47 minutes late, and 13 minutes after the Yarmouth train; all three trains were running late and out of course as the Norwich train should have been the first of the group, followed from Colchester by the Clacton train, with the Yarmouth train last.

According to the statements of the trainmen, really dense fog was first encountered between Chadwell Heath and Goodmayes, up to which point visibility had been fair, and the three trains had been running without serious check. The Clacton and Yarmouth trains made their stops at Shenfield at 6.42 p.m. and 6.48 p.m. respectively, according to the signal box register, and the Norwich train passed Shenfield at 7.2 p.m., after an interval of 14 minutes as compared with 13 on leaving Ipswich. At Chadwell Heath box, 10 miles on, the passing times were 6.57 p.m., 7.3 p.m., and 7.15 p.m; it will be noted that the Clacton and Yarmouth trains had maintained their interval of 6 minutes and that the Norwich train had gained 2 minutes on them.

No times were booked at the next box, Goodmayes East, 1 mile further on, but it appeared from the signalman's statement that the intervals were not very different from those at Chadwell Heath, and none of the trains was checked by his signals. It struck him that the Norwich train was running faster than the other two, perhaps rather faster than he would have expected, as visibility was deteriorating rapidly. He was definite that he could see colour-light signal A at a distance of 565 yards when he called out the fogmen at 7.0 p.m., after consultation with the signalmen on either side; also that it was lost to his view when the Norwich train passed him about 10 minutes later.

8. The fog was evidently spreading eastward from the lower ground, as is shown by the recorded times, given below, at which the fogmen were called out by the various signalmen:-

	Fogmen called	Up Through posts manned	
Ilford East	6.30 p.m.	Signal F	7.40 p.m.
Ilford Carriage Sidings in consultation with Seven Kings	6.50 p.m.	Signal E Signal D	8.15 p.m. 7.30 p.m.
Goodmayes West	6.55 p.m.	7.35 p.m.	
Goodmayes East	7. 0 p.m.		

The Goodmayes and Seven Kings colour-lights, A, B, and C are not fog signalled. It was recorded in the train registers that they had been dimmed at 5.50 p.m. (blackout) and had been restored to "bright" at the same time as the fogmen were called.

9. The conditions will be judged by the fact that the Clacton train occupied 33 minutes in running the 6 miles from Chadwell Heath to Stratford (11 m.p.h.) It appears, however, that the driver had no great difficulty in seeing the colour-light signals A, B and C at GREEN, DOUBLE-YELLOW and YELLOW

respectively, although his engine was driven from the right hand side. He said that the fog became very bad as he approached Seven Kings.

With the slowly moving Clacton train ahead, the Yarmouth train received its first check at Goodmayes West, viz. by signal A at YELLOW, and the signalman heard it braking; it was stopped at signal B for about a minute and at signal C for about 4 minutes, viz. from 7.10 p.m. to 7.14 p.m, according to the register at Seven Kings box. The train then restarted from signal C on acceptance by Ilford Carriage Sidings and went forward slowly; it had also been accepted by Ilford East, but not by Ilford West, and signals F and G were at danger.

10. Driver E.N. Brown, of Ipswich, was in charge of the Yarmouth train, driving from the left hand side. Although he had observed and obeyed the colour-light signals A, B and C, he had only seen B and C at very short range. Thereafter he missed semaphore signals D, E and F, nor did he hear any detonators explode at the co-acting machine of the last named; he just caught sight of the lower co-acting red light of signal G as he passed it, and stopped about 110 yards ahead of Ilford West box, as shown by the diagram. He went to the box, and after a short wait was told by Signalman T. Cutts, who in the meantime had received "Line Clear" behind the Clacton train, that he could proceed.

Almost immediately after Brown had left the box, Cutts received a telephone call from Seven Kings that the Norwich train had passed all the latter's signals at danger; Cutts at once asked Station Inspector C.H. Davey (who had come to the box to ascertain why the Yarmouth train had stopped) to go back with detonators. Davey went back along the island platform, but had not reached the rear of the Yarmouth train when the collision took place.

11. The Yarmouth train had not reached rail contact H, and thus the signalman at Ilford East was not authorised to give "Train Out of Section" to Ilford Carriage Sidings, and his Up Through acceptance plunger was locked; Ilford Carriage Sidings in turn was prohibited, under double block working, from plunging to release Seven Kings signal C, although the plunger was free. Seven Kings, however, with the exemption from double block working, was in a position to accept the Norwich train from Goodmayes West up to signal B at RED, directly the Yarmouth train had operated the rail contact (not shown) ahead of signal C.

The respective signalmen at Goodmayes West, Seven Kings, and Ilford Carriage Sidings were J.E. Sayward, S.A. Barbrook, and W.T. Rolfe. There appears to have been little pressure of traffic, and all three men gave clear and consistent accounts of the sequence of their block working with the Sykes apparatus; also of their subsequent emergency action (Barbrook and Rolfe) after the Norwich train had passed the Seven Kings signals (see later). It is clear that this train was properly accepted by Barbrook. It was offered to him by Sayward, immediately following the receipt by the latter of "Train Out of Section" for the Yarmouth train, which Barbrook had sent directly the train had passed his clearing point, as he was entitled with the colour-light signals. Barbrook's acceptance of the Norwich train proved (by the controls) that both he and Sayward had replaced their signals behind the Yarmouth train.

It is also clear that Barbrook did not offer the Norwich train to Rolfe, who, under double block working, was awaiting the receipt of "Train Out of Section" for the Yarmouth train from Ilford East, before transmitting this signal to Seven Kings. Without an acceptance plunge from Rolfe, Barbrook was unable to change signal C from RED; there was no control to prevent him from changing signal B to YELLOW, but equally there is no reason to disbelieve his statement that he maintained it at RED as the Norwich train approached, with the intention of drawing it forward to signal C (close to the box) to await "Line Clear", after he had stopped it. Both Sayward and Barbrook appear to have been paying attention to their repeaters.

Thus, there can be no reasonable doubt that signals A, B, and C were displayed at YELLOW, RED, and RED respectively for the Norwich train, the enginemen of which were Driver T.E. Latter, and Fireman F.W. Trout.

12. Both men were stationed at Ipswich, and had worked the Norwich train from there, with engine No.8564, driven from the right hand side. Latter, who is 52 years of age, had been a driver for 16½ years. He had worked regularly to Liverpool Street for the last 3 or 4 years with express passenger trains, and was well acquainted with the road. He knew of the signalling alterations at Goodmayes West and Seven Kings, and had passed the new colour-light signals 11 times since their installation was completed on 19th December 1943.

On the Sunday in question he booked on duty at 3.5 p.m. and, after preparing his engine, was waiting in the engine dock for the arrival of the Norwich train which he was due to take forward at 4.40 p.m. The Yarmouth train, however, arrived first, out of course; Latter saw it leave before him, and commented to Driver Brown on the prospect of a foggy journey. He left with the Norwich train 13 minutes later at 5.27 p.m, as has been stated.

13. Latter's regular fireman was absent, and Fireman Trout, who had been booked to work the Ipswich station pilot engine, was sent to him about 40 minutes before the Norwich train left. Trout was a senior fireman, aged 38, but had only been passed for driving. He had only worked to London 3 or 4 times at infrequent intervals, the last occasion being on a Sunday about 5 months before the accident, and he did not know that colour-light signals had been installed at Goodmayes West and Seven Kings. Latter did not question Trout on the subject and was therefore not aware that his experience was so limited.

14. As has been mentioned, Latter had no serious difficulty in observing signals during the earlier part of the journey, but said that between Chadwell Heath and Goodmayes he ran into a blanket of fog; visibility was then practically nil, and he had never experienced conditions so bad. He was aware of his location on passing Goodmayes West and Seven Kings, but admitted that he saw none of the colour-light signals himself; he relied on Trout to observe them on the left hand side, while he kept a look out on his own side for the signal boxes and fogmen.

His statement, however, with regard to these signals and Trout's observation of them was vague. He appeared to remember that Trout had said "Righto" on passing signal B, the Seven Kings outer home, and "Green light" on passing signal C. He added later that he had said to Trout on passing the latter signal "Make sure of that one Fred", and that Trout had replied "It is green - I should not have seen the signal if it had not been a colour-light", or words to that effect. Thereafter neither he nor Trout saw any of the semaphore signals.

Latter said that he shut off steam at Chadwell Heath, on running into the thick fog, and thought that speed at Goodmayes was 20 to 30 m.p.h. After passing Seven Kings he braked a little and "kept rolling steadily". He saw nothing of any of the signal boxes until reaching Ilford East (on his own side) where he heard a shout from the signalman and saw a red light. He at once applied the brake fully, just before the collision, which he suggested took place at 15-20 m.p.h.

He seems to have been under the impression that Ilford Carriage Sidings Box was switched out, but it is not clear why this was so, as the box is always open. He said that he was reassured by the green light at signal C that the line was clear to "the second lot of signals before you come to Ilford Station" (signal E); he assumed that that signal, viz. the Ilford Carriage Sidings starter, was clear because he heard no detonator at it, and was relying on the fogmen being out. (In actual fact, a green light at signal C would have given him a clear road past signal E up to the Ilford East signal F).

Latter stated that it was not his regular practice to rely on his fireman for observing signals, and that he would not have relied on Trout's judgment on this occasion if he had known that the latter had not been over the road for five months. He was not expecting to explode a detonator at signal E if it had been at RED or YELLOW, and had never exploded a detonator at that point before the colour-light signals had been installed. He had had a good night's rest before taking this Sunday afternoon duty, and had no personal worries which might have distracted his attention.

15. If Driver Latter's statement was vague, Fireman Trout's was incoherent and contradictory. It was to the effect that he was looking out for signals all the time from Chadwell Heath onwards, also that he saw signals A and C at very short range, and missed the intermediate signal B altogether. He said at first that the lights of signals A and C were green, and that he called out "Righto" to Latter as he passed them. He said later than he had not been at all sure of their indications as he had had such a fleeting view; it was for this reason that he had contented himself with saying "Righto", and he denied having made any mention to Latter of the colour of their aspects. He felt that "Righto" was a less definite thing to say than "Yellow" or "Green".

Trout appeared to have had very little experience of colour-light signals, although he had seen them occasionally and appreciated the significance of their aspects; as has been stated, he was not aware that signals of this type had been installed at Goodmayes West and Seven Kings, and he seems to have had no precise instruction from Driver Latter as to where to expect them.

Latter and Trout were both submitted to a sight test after the accident, and their colour vision was found to be normal.

16. Emergency action was initiated by Signalman Barbrook at Seven Kings. He received "Train Entering Section" directly after he accepted the Norwich train, and saw his track circuit indicator go to "Occupied" about 2 or 3 minutes later. He went to the door expecting to hear the engine blowing off steam as it stopped at signal B, but he heard the train approaching his box, so he picked up his hand lamp and showed a red light as the engine passed him; he said that he could just see the engine and train through the fog (at a distance of about 6 yards). He then sent the "Train Running Away" signal to Rolfe at Ilford Carriage Sidings; he subsequently telephoned to Cutts at Ilford West and then to Rolfe. He spoke to Ilford West first because he thought that this would give more chance to get detonators on the line, having already sent "Train Running Away" to Ilford Carriage Sidings. He got a reply from Rolfe that the train was just passing, followed by an acknowledgment of the "Train Running Away" signal.

Directly Rolfe received "Train Running Away" from Barbrook, he went to the door with the intention of putting detonators on the line; but the train was almost passing him, and he took his megaphone instead and shouted to the driver. He did not show a red light as he did not think it could possibly be seen (his box is on the outside of the Down Slow line, and about 15 yards from the Up Through). He then sent forward the "Train Running Away" signal to Ilford East. Rolfe was sure that if he had had an emergency detonator placer worked from the frame, he could have got a detonator down in front of the train.

The Ilford East signalman, C.J. Oakley, said that he received the "Train Running Away" signal from Ilford Carriage Sidings about 2 minutes after the Yarmouth train had passed, and just before the Norwich train reached his box; he went outside, shouted, and showed a red light. As explained, Driver Latter saw it and took action, but too late to prevent the collision.

17. Exploded detonator cases were subsequently found in the co-acting machine of signal F, 121 yards in rear of the box, but Oakley confirmed Driver Brown's statement that they were not exploded by the Yarmouth train; nor, he said, had any been exploded during his turn of duty since 2.0 p.m. He also said that it was not his responsibility, on taking duty, to verify that there were fresh detonators in the machine, but that they were usually promptly replaced either by the signal fitter, whose hut is close to the box, or by a platelayer or one of the station staff. He added that the detonators were sometimes fired by the last wheels of a train, if the signal was replaced quickly. Station Inspector Davey said that it was not usual for the signalman to report to him when detonators had been fired and required replacement, and that the signalman himself generally took the necessary steps.

18. Driver Latter's suggestion that the speed of the Norwich train was gradually diminishing has some confirmation from the evidence of the signalmen, although their estimates were rather higher than his. As has been mentioned, Sayward at Goodmayes West heard the Yarmouth train braking as it passed his box (for signal A at YELLOW); he was surprised that the Norwich train, which he thought passed him at about 40 m.p.h. did not also brake, as he had only just had "Train Out of

Section" for the Yarmouth train. Barbrook at Seven Kings thought that the Norwich train passed him at 30 to 40 m.p.h, and he was apprehensive that if it kept on at that speed it would collide with the Yarmouth train ahead. Rolfe at Ilford Carriage Sidings thought that it passed him at 20 to 30 m.p.h. while Oakley at Ilford East was unable to give any estimate of the speed, but he said it was going a good deal faster than the Yarmouth train, which was "just crawling along, coming to a stand".

19. There was some conflict of evidence as to whether the Yarmouth train was on the move when the Norwich train struck it. Signalman Cutts, who said he was watching the Yarmouth train, was sure that this was not so, and that Driver Brown had insufficient time to get back to his engine; he was strongly supported by Inspector Davey, who was alongside the train at the time, on the opposite platform. Davey also said that the coaches were not pushed forward by more than a few feet. On the other hand, Brown, supported by his fireman, stated that he had rejoined his engine, and that the train had begun to move after he had released the brakes and opened the regulator.

The Norwich train appears to have been only 4 minutes behind the Yarmouth train at Seven Kings, having passed that box at 7.18 p.m. as recorded for the "Train Running Away" signal. Taking their relative speeds into consideration, the interval between the arrival of the two trains at Ilford is likely to have been less than this, perhaps as little as 2 minutes as the signalman at Ilford East Box suggested. Under the prevailing conditions, this can hardly have been sufficient for Brown to reach the box, where he appears to have remained for an appreciable time, and return to his engine over the ballast and intervening track. In all the circumstances, the statements of Signalman Cutts and Inspector Davey are much more likely to be correct; it is, therefore, reasonable to assume that the brakes of the Yarmouth train had not even been released when the collision occurred, and that, having regard to the nature of the damage, the Norwich train was then travelling at 20 to 25 m.p.h.

CONCLUSION

20. The fog, which came on very rapidly a short time before the passage of the trains in question, was particularly dense and primarily contributed to the collision. All the evidence showed that it was extending eastward, and it seems likely that the view of the colour-light signals may have deteriorated appreciably during the few minutes which separated the passage of the Clacton and Norwich trains. While it is not suggested that there was any undue delay in the fogsignalling arrangements, it was most unfortunate that signal D, where the fogman arrived only 10 minutes after the collision, was not manned in time; in all probability a detonator at that signal would have had preventive effect.

As already stated, there can be no reasonable doubt that signals A, B, and C were displayed at YELLOW, RED and RED respectively for the Norwich train, while those at D, E, and F were also at Danger. No criticism arises as regards the operation of the signalmen, and those at Seven Kings, Ilford Carriage Sidings, and Ilford East appear to have acted promptly; but they could do little to prevent the collision, in view of the short intervening distances and the speed of the train.

21. With regard to its approach, Driver T.E. Latter apparently knew where he was on passing Goodmayes and Seven Kings - at 30 to 40 m.p.h. according to the signalmen - and had the advantage of well sited colour-light signals, of whose position he was also aware, very soon (abour 1 mile) after he entered the fog. There is no doubt that visibility at Goodmayes and beyond was exceptionally bad, but if he had made an appropriate reduction of speed in good time, and had crossed the footplate to try and see these signals himself, his task would have been appreciably lightened. Instead, he left this to Fireman F.W. Trout, which was not unnatural under the prevailing conditions provided he could be relied upon.

But though Trout was an experienced fireman, he had not been over the road for a long time, and Latter had not troubled to find this out. This seems extraordinary in a man of his age and experience, particularly in war-time when crews are less likely to remain together. Notwithstanding this, however, there appeared to be no doubt that Latter was satisfied by Trout's assurances when passing signals A, and C, at an interval of about one minute. Thereafter, Latter evidently allowed the train to run on with little reduction of speed - Carriage Sidings Box being passed at 20 to 30 m.p.h. according to the signalmen - on the assumption that subsequent signals (which he could not see) would be clear unless a detonator was exploded.

Driver T.E. Latter thus contravened Rule 127 (xxii) vide Appendix II; but apart from that, his failure to run with the caution which the circumstances required, and which is usually shown, indicated a very unimaginative state of mind. Indeed, it is difficult to find any feature which relieves him from serious responsibility, though some share must be borne by Fireman F.W. Trout. Both men, however, have satisfactory records with considerable length of service in their respective grades, and the difficulties of operation under the conditions described should not be overlooked.

For instance, though Latter did not suggest that he had lost location, he suddenly encountered very poor visibility, which continued for 4 or 5 minutes until the collision occurred. There seems little doubt that this, and the darkness, must have contributed to misjudgment of speed over a considerable distance; hence Trout's fleeting view of the colour-light signals. In other words, Latter did not react sufficiently quickly to the conditions with which he was confronted, and while it is true that Brown of the Yarmouth train ahead was more successful, driving from the left-hand side, he also passed F and G semaphore signals at Danger.

RECOMMENDATION AND REMARKS

22. Although the circumstances of the observation of the colour-light signals in this case were thus exceptional, the fact that they were ineffective in stopping the Norwich train more than a mile in rear of the obstruction, affords further confirmation of the conclusions of the 1927 Automatic Train Control Committee, who reported as follows in 1930:-

> "With regard to multiple aspect signals, which alternately fulfil the functions of Warning and Stop signals, we realise the difficulty which exists of providing a method of protection or control, which from the point of view of cost is likely to prove acceptable. It is true that many such signals are of the powerful focussed type, and are therefore more readily seen, even in bad atmospheric conditions, both by day and night, than the usual semaphore arm and oil signal light. The necessity, therefore, for further protection or control where this method of signal lighting is installed appears to be less urgent than in the case of similar signals with ordinary lighting. But cases of accident x x x x x demonstrate the fact that even with this type of powerfully lighted signal, misreading or mistaking of signals sometimes occurs, and the safeguard afforded by better lighting is not therefore complete."

23. The question of co-acting detonator placers at Stop signals was also considered by the 1927 Committee as an "indirect" method of control in those cases where Warning Control at the distant signal is not applicable, e.g. for the immediate protection of fouling points. But such detonator placers afford no certain protection against a following collision, particularly when trains are running in close succession, as immediate replacement is not always practicable if detonators are exploded by the first train. The co-acting machine at signal F, whose function was to give additional protection to the converging junction at Ilford West, was a case in point; as it happened, it was fortunate that detonators were not in position when the Yarmouth train passed, for the collision would then have taken place earlier (away from the platform), and would have been more severe. The arrangements, however, for

renewal of detonators in such machines and for reporting the circumstances of their explosion may be in need of review, as it appeared that at Ilford East no action had been taken for a considerable time.

Detonator placers worked from the signal box frame are in a different category, and it is likely that if Ilford Carriage Sidings box had been so equipped, the signalman would have been able to get a detonator down in front of the Norwich train, which should have warned Driver Latter in time. The value of this apparatus in emergency is recognised, and it is the practice to instal it in signal boxes on important lines in connection with new or alteri work, with colour-light as well as semaphore signals. Extensive resignalling work is to be undertaken on this section of line as soon as opportunity offers and the inclusion of this equipment is recommended; at boxes where such provision has been made, it is incumbent on the signalman under Rule 94 to pl an emergency detonator on the line when he requires to stop a train in fog, whether a fogsignalman has arrived at his post or not.

24. Apart from emergency apparatus of this kind, it seems likely that in the present case nothing less than Automatic Train Control in the form of a Warning brake application at one or more of the semaphore or colour-light signals concerned would have saved the situation. In spite, however, of this and other instances where colour-light signals have been passed at Danger, the view expressed by the Committee in 1930 that the necessity for Control is less urgent with this type of signal, still appears to apply, especially where the installation is continuous, as will be the case on this section of line when the electrification scheme is completed.

Further, signals A, B, and C are immediately to the left of the line at eye level, namely, in the best position for a driver of a left-hand driven engine, which is now the Company's standard for new construction. The engine, however, of the Norwich train was built in 1920 with right-hand controls, and there seems no doubt that this feature contributed to the accident. The Company still has a number of older engines driven from the right-hand side of the footplate, but they are being gradually eliminated, to the advantage of the sighting of signals in their standard position on the left of the line, particularly under adverse weather conditions.

25. The general question of Automatic Train Control was again reviewed in the Report on the accident at Castlecary on this Company's system in December 1937. It was then suggested that, in view of the difficulties of combining two-indication Warning Control equipment with multiple-aspect colour-light signalling, a not unsatisfactory compromise for the time being (pending further examination of the problem in relation to existing and future operating conditions in this country) would result by omitting Control under multiple-aspect signalling, while applying it under the two-aspect syst

Besides the wide extension of colour-light signalling in various forms, close attention was being given to Automatic Train Control during the years preceding the outbreak of war. The Great Western Railway had practically completed the equipment of their system with Control of the Warning (contact) type, after some 30 years' development. The London Midland & Scottish Railway were conducting experiments with Warning Control of the non-contact type, which are continuing. The London & North Eastern Railway were also experimenting with apparatus of the latter type between Glasgow and Edinburgh, but the outbreak of war stopped work.

26. The 1927 Committee (and the earlier Committee of 1921) summarised all the cases of accident from 1911 onwards, into which Ministry Inquiries were held, in relation to the probable effect of Control equipment in one form or another. Their researches showed that during the 10 years ended 30.9.1921, it would have proved effective in 71 of the 193 accidents, or 37%; in the next 8 years ended 30.9.1929, the figure diminished to 29% (50 cases), although train mileage increased from an average of 372 to 392 millions. Statistics

prepared subsequently show that for the 10 years ended 30.9.1939, during which 134 Inquiries were held, the proportion was again lower at 25%, representing 34 cases, the average train mileage having increased still further to 430 millions.

Although the basis of these statistics may seem arbitrary, since only those accidents are included which for one reason or another were selected for formal Inquiry, the improving trend, as indicated by the foregoing figures, is significant. While it should also be borne in mind that some of the 155 accidents during these 28 years were primarily, and possibly mainly, due to signalmen allowing trains to approach contrary to Regulations, it seems undoubtedly true that in some measure the improvement may be ascribed to the assistance afforded to drivers by the extensions referred to of Warning Control and of colour-light signalling, including colour-light distant signals on high speed main lines.

27. There appears to be no reason why the improvement should not be maintained, as the tendency after the war will be towards the more extended use of colour-light signalling for main line and suburban traffic. This in fact is a normal signalling development which, while improving safety, does not require equipment on the locomotive, and every installation is of immediate benefit to the operation of all traffic on the line concerned. It cannot, however, be regarded as a complete substitute for Automatic Train Control, and, in any case, the majority of main line mileage is likely to remain for some years signalled under the two-aspect (mainly semaphore) system, which will have to cater for rising train speeds and traffic density. While the present time is not opportune to formulate an agreed policy with regard to these inter-related questions, the early post-war years should afford a suitable occasion for a fresh review, in the light of past and current research.

We have the honour to be, Sir,
Your obedient Servants,

A.H.L. Mount,

Lt. Colonel.

G.R.S. Wilson,

Major.

The Director General,
Ministry of War Transport.

APPENDIX I

EXTRACT FROM PERMANENT WAY BILL NO.394
FORTNIGHT ENDED 5TH NOVEMBER, 1943

SUNDAY, 24th OCTOBER. Goodmayes West. 7.30 a.m. to 5.0 p.m. A double Junc between Up Local and Up Through Lines and Down Through and Down Local Lines has bee laid in opposite the signal box and will be connected to and worked from signal bo

ALTERATIONS TO SIGNALLING

The Up Through Home signal, carrying Seven Kings Up Through Outer Distant sign will be replaced by a mechanically operated three aspect colour light signal displa Red, Yellow and Green aspects. This signal will also act as Seven Kings East Up Through Distant signal. The signal will be fitted with a Diamond sign.

x x x x x x

EXTRACT FROM PERMANENT WAY BILL NO.398
FORTNIGHT ENDING 31ST DECEMBER, 1943

SUNDAY, 19th DECEMBER. Seven Kings. 7.30 a.m. to 5.0 p.m. Seven Kings East Signal Box will be dispensed with together with the junctions between Through and Local Lines.

Seven Kings West Signal Box will be known as Seven Kings Signal Box.

ALTERATIONS TO SIGNALLING

The Bracket signal carrying East Box Up Through Home signals and West Box Up Through Distant signals will be dispensed with.

x x x x

A new Colour Light signal, displaying red, yellow, double yellow and green aspects, and fitted with a diamond sign will be brought into use on the Up side of t Up Through Line, 440 yards East of box, and will apply as Seven Kings Up Through Ou Home, also acting as Outer Distant signal for both Ilford Carriage Sidings and Newb Park.

x x x x

The Up Through Home signal also controlled from Ilford Carriage Sidings Box, will be replaced by Colour light signal, displaying red, yellow and green aspects, fitted with 2 way junction indications (see Rule 35).

x x x x

TRACK CIRCUITING

The Up Through Line will be Track Circuited from 200 yards on the approach side of the Up Through Outer Home signal to the Up Through Inner Home.

x x x x x x

APPENDIX II

EXTRACT FROM RULES

Rule 127. The Driver MUST -

x x x x

(xxii.) during fog or falling snow, keep a sharp look out for the Fogsignalmen, who, except as prescribed in the first paragraph of Rule 91, clause (f), will repeat the indications exhibited at the fixed signals by showing a red, yellow, or green hand signal, as the case may be, held steadily. When the fog is so dense that the fixed signals cannot be seen by the Driver on approaching them he must, in the case of a distant signal, unless he can see the Fogsignalmen's hand signal, assume that that signal is at Caution and proceed accordingly. Where a stop signal is concerned he must, unless he can see the Fogsignalman's hand signal, assume that the signal is at Danger and stop his train immediately.

Observance of fixed or hand signals during fog or falling snow.

x x x x

L.N.E.R.
(SOUTHERN AREA)
COLLISION AT ILFORD
16-1-44.
Not to Scale.